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REMEDIAL DESIGN/REMEDIAL ACTION WORK PLAN

Cedartown Municipal Landfill Site
Cedartown, Georgia

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1.0 INTRODUCTION

1.1 PURPOSE

The former Cedartown Municipal Landfill (CML Site), located on the perimeter of Cedartown, Georgia, is an abandoned iron mine which was used by the City of Cedartown as a municipal landfill from the mid 1950s to mid-May 1980. The majority of the wastes disposed of at the CML Site were municipal solid wastes. Lesser amounts of industrial wastes were also reportedly disposed of at the CML Site.

In the late 1980s, the United States Environmental Protection Agency (USEPA) conducted a preliminary assessment of the CML Site which involved an initial site investigation and an evaluation of the CML Site using the Hazardous Ranking System (HRS). The aggregate HRS score for the CML Site was 33.62, which derived exclusively from groundwater. The CML Site was subsequently proposed for inclusion on the National Priorities List (NPL) in June 1988 and was finalized in March 1989.

The Cedartown Municipal Landfill Site Group (Group) completed a Remedial Investigation (RI) and Feasibility Study (FS) in July 1993 pursuant to USEPA's Administrative Order on Consent (AOC). The results of the RI indicated that potential exposure to Site-related chemicals in surface water, soil and sediments does not result in an unacceptable cancer risk or non cancer hazard. However, the estimated potential cancer risk and non cancer hazard from potential future exposure to groundwater exceeded USEPA's target risk range and a hazard quotient of one. Therefore, USEPA established remedy Performance Standards for those chemicals which exceeded USEPA's target risk range or Safe Drinking Water Act Maximum Contaminant Level (MCL) to ensure that any future groundwater users would not be exposed to unsafe levels of Site-related contaminants.

This document presents the Remedial Design/Remedial Action Work Plan (RD/RA Work Plan) for the CML Site. The RD/RA Work Plan describes the tasks necessary to implement the remedial action specified in the Record of Decision (ROD) issued on November 2, 1993. The RD/RA

Work Plan is required by USEPA pursuant to the Unilateral Administrative Order (UAO) for the RD/RA dated March 22, 1994.

1.2 RD/RA OBJECTIVES

The objectives of RD/RA are presented in Section II Statement of Work (SOW) provided as Appendix 2 of the UAO. The objectives are:

"Prevent or mitigate the continued release of hazardous substances, pollutants and contaminants to the overburden and bedrock aquifers;

Prevent or mitigate the continued release of hazardous substances, pollutants and contaminants at the Site to surface water bodies and sediments;

Eliminate or minimize the threat posed to human health and the environment from potential migration of hazardous substances in the groundwater at the Site; and

Reduce concentrations of hazardous substances, pollutants and contaminants in ground water to levels specified by the Performance Standards."

1.3 DESCRIPTION OF THE SELECTED REMEDY

In order to meet the above-noted objectives of RD and RA, USEPA selected a remedy based on the FS. The selected remedy as described in the Declaration of the ROD is as follows:

"DESCRIPTION OF THE SELECTED REMEDY

This action is the first and final action planned for the Site. This alternative calls for the design and implementation of response measures which will protect human health and the environment. The

action addresses the principal threat at the Site, the contaminant sources in the *wastes, as well as the ground water contamination at the Site.*

The major components of the selected remedy include:

- *cover maintenance and seep controls;*

- *institutional controls, such as record and deed notices, zoning and land-use restriction;*

- *ground/surface water monitoring program to insure natural attenuation processes would be effective and that contaminants would not migrate;*

- *a two year review during which EPA would determine whether ground water Performance Standards continue to be appropriate and if natural attenuation processes are effective. EPA shall consider and at* EPA's *discretion implement an active ground water remediation if ground water Performance Standards continue to be appropriate and natural attenuation processes are not effective,*

- *a contingency remedial action which includes ground water extraction, on-Site treatment, and discharge under National Pollutant Discharge Elimination System (NPDES) to a nearby surface water or POTW; and,*

- *continued ground water monitoring upon attainment of the Performance Standards at sampling intervals to be approved by EPA. The ground water monitoring program would continue until EPA approves a five-year review concluding that the alternative has achieve continued attainment of the Performance Standards and remains protective of human health and the environment."*

1.4 RD/RA WORK PLAN ORGANIZATION

The RD/RA Work Plan is organized as follows:

Section 1.0	Introduction
Section 2.0	Background
Section 3.0	Remedial Design Activities
Section 4.0	Remedial Action Tasks
Section 5.0	Operation and Maintenance Plan
Section 6.0	Performance Standards Verification Plan
Section 7.0	Project Management Plan
Section 8.0	Community Relations Support
Section 9.0	Schedule.

The Sampling and Analysis Plan (SAP) consisting of a Field Sampling Plan (FSP) and a Quality Assurance Project Plan (QAPP), is presented in Appendix A. The Health and Safety Plan (HSP) is presented in Appendix B.

2.0 BACKGROUND

2.1 SITE DESCRIPTION

The CML Site is located in Polk County on the outskirts of the City of Cedartown, Georgia, approximately 62 miles northwest of Atlanta, Georgia. The Site encompasses a former iron ore mine which subsequently was used as a municipal landfill. The CML Site is situated on the western edge of Cedartown and is bordered on the east by Tenth Street, the south by Route 100 (Prior Station Road), and the north and west by undeveloped and/or agricultural land. All portions of the CML Site are now controlled by the City of Cedartown (see Section 3.1.1). The general location of the Site and a Site plan are illustrated on Figures 2.1 and 2.2, respectively.

Property immediately east of the CML Site consists of an industrial complex while land to the north, south and west is a mixture of residential, agricultural and undeveloped land.

The CML Site, which consists of land formerly used as part of the landfill operations, occupies approximately 94 acres. The CML Site itself is well vegetated with wooded areas along the north, south, and west. A seasonal stream and pond, which appear during periods of high precipitation, exist approximately 700 feet west of the western CML Site perimeter. The eastern half of the Site is covered by thick grasses. Approximately 10 acres of land, situated between the eastern and western halves of the CML Site, were not used for landfill operations. This area includes the pond situated directly behind the former Rome Coca-Cola Bottling Company building (referred to herein as the "Coke Pond") and the lands in and around the former Leary residence (formerly situated immediately north of the Coke Pond).

All neighboring residences and industries within the City limits are serviced by municipal water.

The surface of the CML Site is grassed with limited areas of exposed soil mainly occurring northeast of the location of the former Leary home. The crown of the Site is 872 feet above mean sea level (AMSL) and

gently slopes on all sides with the exception of portions of the western perimeter which are relatively steep (9 percent slope). Minor areas of surficial erosion were observed in the central, northwest and eastern portions of the CML Site. No exposed refuse was observed in any of the erosion areas noted. A leachate seep was observed on Site west of the Coke Pond. Conditions observed during the RI and reported therein indicated isolated pockets of waste materials were distributed throughout the Site and were encapsulated within the low-permeability native clays and isolated from surface by a clay soil cover (1 to 12 feet thick).

Although the CML Site is not fenced, access is limited due to the dense vegetation which occurs around the northern, western and southern boundaries. The primary access route from the east directs traffic past the City garage and is restricted by a fence gate which limits vehicle access to the CML Site.

2.2 SITE HISTORY

A comprehensive description of the development of the CML Site, based on a review of the aerial photographs and other pertinent Site information, is provided in the RI Report. A summary of the Site history is presented below.

The CML Site was originally developed in the 1880s as an iron ore strip mine. Mining operations continued at the CML Site, with some interruptions, until the mid 1900s. At that time, portions of the CML Site were leased and/or subsequently acquired by the City of Cedartown for development as a municipal landfill.

Pits resulting from the strip mining operations were utilized by the City of Cedartown and Polk County as disposal areas for municipal and, to a lesser extent, industrial wastes. These pits contained native clay or may have been partially backfilled with clay previously stockpiled from the mining operations prior to placement of waste materials. Once waste was in place, the pits were covered and graded.

This type of operation is significantly different than common landfill operations of the period where wastes were placed in large common fill disposal cells with occasional daily and/or interim cover material. The lack of on-going, irregular settlement of the existing cap may be attributable to the shallow intermittent disposal practices which occurred.

The outer limits of the area used for waste placement within on-Site pits, as determined during the RI, are illustrated on Figure 2.3.

While the landfill received primarily municipal solid sanitary waste during its operation, limited quantities of non-hazardous industrial waste were also reportedly disposed of at the Site. The industrial wastes disposed of at the CML Site were thought to include the following:

i) sludge from an industrial waste water treatment system;
ii) animal fat and vegetable oil skimmings from a separation unit;
iii) liquid dye wastes;
iv) latex paint and paint sludges; and
v) plant trash.

In 1979, in accordance with then applicable State regulations pertaining to the closure of landfills, the Site was covered with a layer of clay soil varying in thickness from 1 to 12 feet. A vegetative cover was then established over the soil layer to prevent erosion. In a letter dated February 10, 1981 addressed to Mr. J.J. Brooks, City Manager, Alan R. Laros of the Department of Natural Resources confirmed, based on his inspection of the CML Site, that the Site closure satisfied then applicable closure requirements. This approval letter also reiterated the need to maintain the Site "with special attention given to erosion control and to the development of adequate vegetative cover", for a minimum of one year.

On June 6, 1985, a representative of USEPA completed an initial site inspection to evaluate conditions at the CML Site and identify areas of potential investigation.

In October 1986, an initial reconnaissance of the CML Site was completed by representatives of NUS Corporation (NUS). Subsequently, during 1987 and 1988, an investigation of the CML Site was conducted by NUS. The results of this investigation are summarized in Section 2.0 of the RI Report.

USEPA evaluated the CML Site, based on data collected by NUS, using the HRS. The aggregate HRS score derived for the CML Site as evaluated by USEPA was 33.62, which was based entirely upon a groundwater route score of 58.16. The groundwater route score was based on the reported presence of four organic compounds in on-Site groundwater, as reported by NUS, and the proximity of the CML Site to the Newala Limestone and Knox Group aquifers. The CML Site was subsequently proposed for inclusion on the NPL in June 1988 and was finalized in March 1989.

The Cedartown Municipal Landfill Site Group (Group) completed a Remedial Investigation (RI) and a Feasibility Study (FS) in July 1993 pursuant to USEPA's Administrative Order on Consent (AOC). The results of the RI indicated that potential exposure to Site-related chemicals in surface water, soil and sediments do not result in an unacceptable cancer risk or non-cancer hazard. However, the estimated potential cancer risk and non cancer hazard from future potential exposure to groundwater exceeded USEPA's target risk range and a hazard quotient of one. Therefore, USEPA established remedy Performance Standards for those chemicals which exceeded USEPA's target risk range or Safe Drinking Water Act Maximum Contaminant Level (MCL) to ensure that any future groundwater users would not be exposed to unsafe levels of Site-related contaminants.

2.3 SITE GEOLOGY AND HYDROGEOLOGY

The geologic units encountered during the RI included:

i) fill materials;
ii) residuum/saprolite; and
iii) the Newala Limestone.

The characteristics of the stratigraphic units encountered on Site are presented below. Stratigraphic information for the RI wells is presented in the RI Report.

Fill Materials

As previously noted, placement of waste materials was not uniform across the landfill. Likely waste fill deposit locations were identified through aerial photographs and discussions with former landfill workers. Even though the investigative boreholes were subsequently located within the limits of the suspected fill areas, only 11 of the 30 boreholes advanced on Site encountered waste materials. When encountered, waste materials typically consisted of municipal/industrial refuse including plastic, cardboard, glass, wood and metal. Waste materials, where encountered, were found to range from one foot thick (borehole LW-2A) to 30 feet thick (leachate well LW-1). On the landfill proper, the cover material and fill materials consisted of orange to red mottled clay. This Kaolinite-rich clay was likely obtained from on-Site stockpiles generated during historical mining of iron deposits. This clayey mixture visually appears to be consistent with the clays of the residuum/saprolite described below.

The fill materials were not tested for hydraulic conductivity as part of the RI. The hydraulic conductivity of fill materials found in typical landfills is expected to range from 1×10^{-2} cm/sec to 1×10^{-4} cm/sec. Hydraulic conductivity is a function of both the size of the pore openings and the interconnectiveness of the pores; therefore, the larger the grain size of the material the greater the hydraulic conductivity. Also, the greater the volume of waste present the greater the hydraulic conductivity. This, however, was not observed at the Cedartown Site where there is a relatively small amount of waste compared to vast amounts of clay.

Residuum/Saprolite

A residuum/saprolite unit was encountered on Site beneath the fill materials and at the surface in off-Site areas. The residuum

consists of weathered in place bedrock that displays no recognizable original bedrock structure. Saprolite is similar to residuum in its formation but has been weathered to a lesser degree so that some original bedrock structure is discernible. The residuum was described as stiff to very stiff, Kaolinite-rich clay to sandy clay with a measured vertical hydraulic conductivity of 1.06×10^{-7} cm/sec to 3.08×10^{-7} cm/sec. The unit also contained frequent iron nodules.

The total thickness of this unit varied from 20 feet to 156 feet. Beneath the landfill, the total thickness of residuum/saprolite was found to range from 20 to 80 feet.

This low vertical hydraulic conductivity combined with the thickness of the unit beneath the fill (20 to 80 feet) indicates this unit will act as an aquitard and mitigate against the migration of leachate into the underlying aquifer.

Newala Limestone

The Ordovician age Newala Limestone was encountered below the residuum/saprolite unit in each of the seven perimeter bedrock monitoring wells completed as part of the RI. The Newala Limestone was investigated to depths ranging from 9 to 60 feet from the top of the bedrock during the RI. The primary post-depositional feature of the Newala Limestone is the presence of Karstic features. The presence of void spaces in the bedrock was noted at wells OW-1, OW-2, OW-3, and OW-6B.

The two geologic cross sections indicate that the top of rock was encountered at elevations ranging from approximately 770 feet AMSL to 785 feet AMSL. The variation of the thickness of overburden across the Site is influenced by previous mining operations and historical landfilling activities.

The majority of groundwater flow beneath the Site occurs through the highly transmissive Newala Limestone. The Newala Limestone is locally a productive aquifer, which is relied on by the City of Cedartown for

its water supply. Groundwater is primarily transmitted through secondary openings in the karstic features. The rock matrix itself has very little primary permeability due to the cementation of the pore openings.

2.4 NATURE AND EXTENT OF CONTAMINATION

2.4.1 General

The presence and distribution of constituents detected in various media sampled on and in the vicinity of the Site are summarized in the subsections which follow. Media sampled include: waste/soil and leachate in the on-Site disposal areas; on- and off-Site soils; surface waters and sediments; liquids/solids from an identified seep; and off-Site groundwater.

No pesticides or polychlorinated biphenyls (PCBs) were detected in any samples collected on or off the Site. Therefore, these parameters will not be discussed further. Base/Neutral Acid Extractables (BNAs) were reported in some media samples collected. Limited volatile organic compounds (VOCs) and metals were the constituents most commonly reported in the media sampled.

2.4.2 Waste/Soil

On-Site waste/soil samples were collected from areas of identified or suspected waste disposal. These data were compared to the analytical results for soils obtained from off-Site sampling locations (OW-4, OW-5, OW-6A and OW-6B) which did not appear to have been impacted by landfilling activities. A summary of the detected compounds in the on-Site waste/soil samples is presented in Table 2.1, along with the off-Site soil data.

No significant concentrations of VOCs were reported in the off-Site soil samples, confirming that their presence on Site is likely attributable to landfilling activities. One detection of 1,2-dichloroethane was reported in one subsurface soil sample (4 to 6 feet below grade) at a

concentration of 180 ppm. The sample was collected from a discreet discolored soil seam and is not representative of typical Site conditions. As indicated in Table 2.1, BNA detection frequencies were variable and their presence in the waste/soil samples is likely due to landfilling activities. However, as discussed in the BRA, there is not an unacceptable risk due to the BNAs in the waste/soil.

Some metals were detected in the waste/soil samples above background levels for Site soils, however, the BRA supports that inorganics in the waste/soil samples do not present an unacceptable risk.

2.4.3 Leachate

A summary of the detected compounds in the landfill leachate is presented in Table 2.2. VOCs and metals were the most common constituents reported in the leachate samples. Leachate samples were not field filtered and were typically reported as cloudy or silty resulting in metal concentrations which could potentially be artificially high.

The major constituents of the leachate are: xylenes, chromium, iron, lead, sodium, chloride, hardness and sulphate. Most of these parameters except chromium and lead, occur within the leachate at concentrations below MCLs. Iron concentrations in the leachate are above the SMCL which is an aesthetic standard (taste, colour, odor, etc.; i.e., this is not a health based standard). The presence of metals in leachate is common as metals are constituents of the waste and the cover material.

2.4.4 Soils

A summary of the detected compounds in Site soils is presented in Table 2.3. No significant levels of VOCs and BNAs were found in any of the soil samples. Chromium levels ranged from 19 to 49 mg/kg with a mean concentration of 31.6 mg/kg. The levels reported by Dragun 1988 ranged from 30 to 100 mg/kg, with a mean of 41 mg/kg. Some high levels of

manganese were reported in two off-Site soil samples at concentrations of 33,000 mg/kg and 7,900 mg/kg in surficial soil samples from boreholes OW-1 and OW-2, respectively. Aside from these two detections, manganese levels in the Site soils were within background levels. Arsenic levels ranged from 4.6 to 27 mg/kg with a mean concentration 12.9 mg/kg, which is below background levels of 17.7 mg/kg. Levels of barium and beryllium ranged from 49 to 1,100 mg/kg and 0.7 to 6.7 mg/kg, respectively. Mean concentrations for barium at 283 mg/kg and beryllium at 3.7 mg/kg were above respective background levels of 113 and 2.6 mg/kg. Detections of cadmium ranged from 0.6 to 2.4 mg/kg and the mean concentration was 1.2 mg/kg. Detections in background soils gave a mean concentration of 0.6 mg/kg. Lead levels ranged from 6.4 to 100 mg/kg with a mean concentration of 31 mg/kg, which is below background levels of 49 mg/kg. Cobalt was detected at concentrations ranging from ND to 470 mg/kg, with an average concentration of 111 mg/kg. Zinc concentrations ranged from 38 to 650 mg/kg, with an average concentration of 381 mg/kg.

Contamination of surficial soils appears to be limited to the soils/sediments impacted by the East Seep.

2.4.5 Groundwater

A summary of the detected compounds in groundwater at the Site is presented in Table 2.4. The following section presents a synopsis of the groundwater analysis performed during the RI. It should be noted that monitoring wells OW-6B and CL-09-WP represent background conditions.

Groundwater samples collected were not field filtered. This protocol is in accordance with applicable USEPA guidance. Of all groundwater samples collected, only four samples were noted as clear [both rounds from OW-3 and OW-6B (upgradient well)]. The presence of sediment in the remaining groundwater samples can potentially influence some results, particularly inorganics, and these results might be artificially high. Additionally, this bias can be reduced through utilizing low flow sampling techniques.

Certain metal concentrations reported may have been impacted by sample sediments or turbidity, however, this impact can be reduced through utilizing low flow sampling techniques and proper well construction.

Of particular note is the presence of chromium which was detected in the groundwater upgradient of the Site, as well as in all cross- and down-gradient monitoring wells. In response to comments received from the USEPA regarding the draft RI Report, an evaluation of the potential migration of chromium through the base of the landfill Site was undertaken. Analytical data showed that chromium was not detected in the groundwater collected during the third round of groundwater sampling. Six downgradient perimeter wells and background well CL-09-WP were sampled and all results for chromium were non-detect. Manganese was also analyzed in the third round, and levels were similar to those found during the first and second round.

2.4.6 Surface Water/Sediment

A summary of the detected compounds in surface water and sediment samples is presented in Tables 2.5 and 2.6, respectively.

Surface water and sediment samples collected from the east side of the landfill, upgradient of the Coke Pond and downgradient of the "east seep" contain reported concentrations of various VOCs, BNAs and metals. The constituents detected are generally consistent with those reported in the seep liquids and likely attributable to discharge from the seep. The potential impact of the seep further downgradient, however, is not noticeable as noted below.

The surface water samples from the Coke Pond had one reported VOC (acetone) and no BNAs, pesticides or PCBs were reported. Only four inorganics, including calcium, iron, manganese, and zinc were reported in the surface water sample from the Coke Pond. Several inorganics were

reported at elevated levels in the sample of the ponded seep area, upgradient of the Coke Pond. This indicates the presence of the east seep has had no noticeable impact on the surface water quality of the Coke Pond.

Surface water samples from the East Seep ponded area contained concentrations of aluminum, chromium, copper and zinc in exceedance of both the acute and chronic AWQC. Iron and lead concentrations also exceeded the chronic AWQC. These levels may reflect leachate seepage from the landfill. However, exposure of aquatic biota to these contaminant levels is not a concern due to the limited potential of the East Seep ponded area to provide a suitable habitat for aquatic biota, aside from the contaminants present. Inorganics detected in the surface water of the Coke Pond did not exceed acute or chronic AWQC. This indicates that Site-related inorganic contaminants (i.e., from the east seep) are not currently impacting the surface water in the Coke Pond at levels that might cause adverse effects on aquatic biota living in the pond. The potential still exists for future migration of contaminants from the east seep into the Coke Pond.

A sediment sample from this same location had reported concentrations of acetone and 2-butanone which were also detected in the East Seep ponded area and may be attributable to the seep or adjacent commercial activities. These concentrations further suggest the Site has had minimal impact on off-Site surface water or sediment quality. The potential does exist though for the future migration of contaminants from the east seep into the Coke Pond.

2.5 BASELINE RISK ASSESSMENT

A Baseline Risk Assessment (BRA), consisting of a Public Health Evaluation (PHE) and a preliminary ecological evaluation, was performed as part of the RI and is presented in the RI Report.

The BRA identified chemicals of potential concern for the various media investigated during the RI. The chemicals of potential concern included a limited number of VOCs, BNAs and metals.

Potentially exposed populations under current and future conditions were identified and evaluated. The populations potentially exposed were determined to be adults and older children who would trespass on the Site, and municipal maintenance workers who are required to enter the Site.

Scenarios were developed to evaluate current potential exposure from contact with or incidental ingestion of surface soil/sediment and surface water by trespassers and on-Site workers, and potential exposure from trespassers swimming in the Coke Pond and/or ingesting fish caught in the Coke Pond.

Potential future exposure scenarios included the exposures examined under current conditions as well as potential exposures of future residents in area homes to groundwater from residential wells that, although highly unlikely, could be developed in the area.

Carcinogenic risks and non-carcinogenic hazards were estimated for each of the exposure scenarios by applying standard procedures. The estimated additional cancer risk and non-carcinogenic hazards quotient (HQ) for all exposure scenarios, except potential future off-Site groundwater ingestion, were well below 1×10^{-6} and 1, respectively. The landfill soil/waste does not present an unacceptable risk, therefore, no consideration of hot spot removal, treatment or consolidation is required.

For groundwater, the estimated potential excess cancer risk was 4×10^{-4} (mean) and 2×10^{-3} reasonable maximum exposure (RME) and the estimated hazard index was 30 (mean) and 40 (RME). The estimated potential cancer risk is derived primarily from arsenic and beryllium. The RME concentration of arsenic (10 µg/L) is below the MCL (50 µg/L), while beryllium is within maximum background levels. The estimated hazard indices are driven by arsenic and manganese. Manganese drives 89 percent of the hazard index which is present at an RME concentration of 2 mg/L.

The BRA as presented in the RI identified uncertainties with respect to the risk calculations. The major uncertainty in the BRA was assumption of steady state conditions, that is that the concentrations presently detected in the groundwater will remain unchanged. This may not be accurate since any compounds originating from the CML Site may decrease with time due to various processes, including a reduction in the source and natural attenuation processes (dilution and dispersion).

The BRA shows that beryllium and manganese present a potential future unacceptable risk for groundwater use. Background levels for these inorganics cannot be established based on substantial analytical differences between background wells, however, elevated detections were noted in previous groundwater and background sampling results. Sampling and background uncertainties will be further defined and verified by low flow sampling techniques during RD and/or groundwater monitoring program.

Based on the results of the BRA, the estimated potential cancer and non-carcinogenic risks from future exposure to groundwater exceed the EPA's cleanup target risk range and an HQ of 1 for several contaminants of concern. Therefore, the EPA established Performance Standards for chemicals in groundwater at levels above EPA's target risk range or Safe Drinking Water Act MCL to ensure that any future groundwater users would not be exposed to unsafe levels of Site-related contaminants. A summary of the groundwater contaminants of concern versus the Performance Standards is provided in Table 2.7.

The estimated potential exposure to Site chemicals in surface water, surface soil, and surface sediments do not result in unacceptable cancer or non-cancer risks at the Cedartown Municipal Landfill Site. In addition the preliminary ecological and environmental evaluation which was performed leads to a conclusion that the Site provides an excellent habitat for a variety of wildlife and that chemical exposures on the Site do not represent a threat to wildlife which may inhabit the area. However, the potential does exist for the migration of contaminants from the East Seep ponded area to the Coke Pond. Therefore, the surface water contaminants of concern in the Coke Pond were identified based on the chemistry of the

surface water sample from the East Seep ponded area. The surface water contaminants of concern and their corresponding Performance Standards are provided in Table 2.8.

3.0 REMEDIAL DESIGN TASKS

3.1 SELECTED REMEDY

The tasks that will be undertaken in the RD of the selected remedy are:

i) the implementation of institutional controls;
ii) the decommissioning of existing monitoring wells that will not be used in the monitoring program; and
iii) the installation of an additional background well.

The details of these RD tasks are provided below.

3.1.1 Task 1 - Institutional Controls

The ROD required the implementation of institutional controls to prohibit the use of groundwater and prevent the future disturbance of landfilled areas. The types of institutional controls contemplated by USEPA, and described in Chapter 9.0 of the ROD were:

"1) Deed or Record Notices would be placed on the landfill property and those properties affected by contaminated ground water;

2) Municipal ordinances concerning permitting the installation of wells would be applied to prevent ground water well installation on the Site and/or affected properties, and;

3) The Municipalities (City of Cedartown and/or Polk County) would annex all site properties and implement zoning restrictions that prevent development that would disturb or adversely change existing Site conditions of the Site and prevent ground water use of properties affected by the Site."

Since the issuance of the ROD, the City of Cedartown (City) has obtained a written agreement from the owners of the lands on which landfilling activities have occurred to have these lands deeded to the City at no cost. The City has been negotiating this agreement with the following parties: the Leary Estate; Hon Company; Tilley Properties; and the William Benefield Construction Company, Inc. The City is now surveying the exact dimensions of the relevant properties. Once the acquisition of the lands is completed, the final survey will be sent to the USEPA for completion of the institutional controls. Notices will be placed on the deeds of these parcels prohibiting the use of groundwater for potable and industrial use.

Following the acquisition of these lands, the City will annex the lands and impose restrictive zoning classifications. USEPA will be provided with a copy of the planning amendment and zoning classification.

In addition, the State of Georgia has recently promulgated the Hazardous Site Response Act (HSIRA). This act also requires the implementation of institutional controls at the CML Site.

These actions by the City, will meet the requirements of institutional controls intended in the ROD.

3.1.2 Task 2 - Monitoring Well Decommissioning

Not all existing monitoring wells will be included in the groundwater monitoring program. In addition, five monitoring wells installed by NUS Corporation straddle the residuum/bedrock interface, and one was drilled into the bedrock through the waste without first isolating the waste. These wells may act as potential conduits of contamination to the bedrock aquifer. Therefore, it is proposed to decommission four existing NUS monitoring wells as follows:

Well No.	Description
CL-02-WP	Well screen straddles residuum/bedrock interface
CL-08-WP	Drilled through the waste
CL-09-WT	Shallow well, not required in monitoring program
CL-11-WP	Unknown lithology

The locations of the monitoring wells to be decommissioned are illustrated on Figure 3.1, while their construction details are presented in Table 3.1.

The full details of the field procedures for well decommissioning are provided in the FSP (Submittal A1 of Appendix A). In addition, all field activities will be in accordance with the HSP presented in Appendix B.

3.1.3 Task 3 - Background Well Installation

During the RI, two monitoring wells (CL-09-WP and OW-6B) were designated as background wells. The purpose of these background wells was to provide an indication of the soil and groundwater chemistry for similar Site geologic conditions unaffected by landfilling operations. However, there was a variation of chemistry between these two wells during the three sampling events performed during the RI. In order to improve the definition of background water quality, an additional background well will be installed in a location adjacent to the Site and upgradient of the landfill as shown on Figure 3.2. If it is determined that this location is not representative of typical Site conditions then an alternative background well location shall be determined at that time.

The monitoring well installation details are provided in the FSP (Submittal A1 of Appendix A).

3.2 CONTINGENT REMEDY

3.2.1 General

The ROD allowed for a contingent remedial action in the event that source control and natural attenuation do not meet the groundwater Performance Standards presented in Section 6.2. The contingent remedy consists of groundwater extraction, groundwater treatment and discharge to surface water under an NPDES permit.

In the event that USEPA determines that contingent remedial action must be implemented, the following additional requirements will apply.

3.2.2 Task I - Project Planning

Site Background

The Group will gather and evaluate the existing information regarding the Site and shall conduct a visit to the Site to assist in planning the contingent remedy RD/RA as follows:

1. Collect and Evaluate Existing Data and Document the Need for Additional Data

   Before planning the contingency remedy RD/RA activities, all existing Site data shall be thoroughly compiled and reviewed by Respondents. Specifically, this shall include the ROD, RI/FS, and other available data related to the Site. This information shall be utilized in determining available data needed for RD/RA implementation. Final decisions on the necessary data and Data Quality Objectives (DQOs) shall be made in conjunction with EPA.

2. Conduct Site Visit

A Site visit shall be conducted with the EPA Remedial Project Manager (RPM) during the project planning phase to assist in developing a conceptual understanding of the RD/RA requirements of the contingent remedy for the Site. Information gathered during this visit shall be utilized to plan the project and to determine the extent of the additional data necessary to implement the RD/RA.

Project Planning

Once the Group has collected and evaluated existing data and conducted a visit to the Site, the specific project scope shall be planned. Respondents shall meet the EPA at the completion of this evaluation regarding the following activities and before proceeding with Task II.

3.2.3 Task II - Additional Data Collection Activities Planning

There are not sufficient data available in RI, FS, or ROD to complete the design of the contingent remedy. Based on the current understanding of the data, it is anticipated that the following activities may be undertaken:

i) the installation of test extraction wells;
ii) the performance of step-drawdown and constant-discharge aquifer tests;
iii) the evaluation of the pumping tests and Site-specific groundwater modeling; and
iv) the performance of a treatability study.

The additional data collection planning will provide the technical details for the design of the contingent remedial action. The following plans will be prepared and submitted to USEPA for review and approval prior to the initiation of any field activities:

i) Additional Data Collection Activities Work Plan;
ii) Treatability Study Work Plan;
iii) Treatability Study SAP, if required; and
iv) Treatability Study HSP, if required.

Additional Data Collection in Activities Work Plan

The Additional Data Collection Activities Work Plan will be submitted within 45 days of USEPA notification of the implementation of the contingent remedy. This work plan will present in detail the additional data collection activities needed to complete the design of the contingent remedy.

Treatability Study Work Plan

The group will prepare a Treatability Study Work Plan for EPA review and approval within 45 days of EPA notification of implementation of the groundwater contingent remedial action. The purpose of the Treatability Study is to determine if the particular technology or vendor of this technology is capable of meeting the Performance Standards. The Treatability Study Work Plan shall describe the technology to be tested, and test objectives, experimental procedures, treatability conditions to be tested, measurements of performance analytical methods, data management and analysis, health and safety, and residual waste management. The DQOs for the treatability study shall be documented as well. If required, the Treatability Study Work Plan may also describe pilot plant installation and startup, pilot plant operation and maintenance procedures, and operating conditions to be tested. If testing is to be performed off Site, permitting requirements shall be addressed. A schedule for performing the treatability study shall be included with specific dates for the tasks, including, but not limited to, the procurement of contractors and the completion of sample collection, performance, sample analysis, and report preparation. The Work Plan shall describe in detail the treatment process and how the proposed vendor or technology will meet the Performance standards for the Site. The Treatability Study Work Plan shall also address how all discharge requirements for any and all treated material, air, water and the expected

effluent will be met. Additionally, the Work Plan shall also explain the proposed final treatment and disposal of all material generated by the proposed treatment system. Any and all permitting requirements shall also be addressed.

Treatability Study Sampling and Analysis Plan (if required)

If EPA determines that the Remedial Design SAP (presented in Appendix A), is not adequate for defining the activities to be performed during the Treatability study, a separate Treatability Study SAP shall be prepared by Respondents for EPA review and approval. It shall be designed to monitor pilot plant performance.

Treatability Study Health and Safety Plan (if required)

If EPA determines that the Remedial Design Health and Safety Plan (presented in Appendix B) is not adequate for defining the activities to be performed during the Treatability Study, a separate Treatability Study Health and Safety Plan shall be developed by Respondents. EPA will not approve Respondents' Health and Safety Plan, but rather EPA will review it to ensure that all necessary elements are included, and that the plan provides for the protection of human health and the environment.

3.2.4 Task III - Preliminary Design

Preliminary Design shall begin with initial design and shall end with the completion of approximately 30 percent of the design effort. At this stage, the Group shall field verify, as necessary, the existing conditions of the Site. The technical requirements of the Remedial Action shall be addressed and outlined so that they may be reviewed to determine if the final design will provide an effective remedy. Supporting data and documentation shall be provided with the design documents defining the functional aspects of the project. EPA approval of the Preliminary Design is required before proceeding with further design work, unless specifically authorized by EPA. The Preliminary Design submittal which will consist of the following:

1. Results of Data Acquisition Activities

Data gathered during the project planning phase shall be compiled, summarized, and submitted along with an analysis of the impact of the results on design activities. In addition, surveys conducted to establish topography, rights-of-way easements, and utility lines shall be documented. Utility requirements and acquisition of access, through purchases or easements, that are necessary to implement the RA shall also be discussed.

2. Design Criteria Report

The concepts supporting the technical aspects of the design shall be defined in detail and presented in this report. Specifically, the Design Criteria Report shall include the preliminary design assumptions and parameters, including:

a. Waste characterization,
b. Pretreatment requirements,
c. Volume of each media requiring treatment,
d. Treatment schemes (including all media and by-products),
e. Input/output rates,
f. Influent and effluent qualities,
g. Materials and equipment,
h. Performance standards,
i. Long-term monitoring requirements.

3. Preliminary Plans and Specifications

Respondents shall submit an outline of the required drawings, including preliminary sketches and layouts, describing conceptual aspects of the design, unit processes, etc. In addition, an outline of the required specifications including Performance Standards, shall be submitted. Construction drawings shall reflect organization and clarity, and the scope of the technical specifications shall be outlined in a manner reflecting the final specifications.

4. Plan for Satisfying Permitting Requirements

All activities must be performed in accordance with the requirements of all applicable federal and state laws and regulations. Any off-Site disposal shall be in compliance with the policies stated in the Procedure for Planning and Implementing off-Site Response Actions (Federal Register, Volume 50, Number 214, November 1985, pages 45933 - 45937) and Federal Register, Volume 55, Number 46, March 8, 1990, page 8840, and the National Contingency Plan, Section 300.440. The plan shall identify the off-Site disposal/discharge permits that are required, the time required to process the permit applications, and a schedule for submittal of the permit applications.

5. Treatability Study Final Report

Following completion of the study, a report shall be submitted on the performance of the technology to EPA for review and approval. EPA will evaluate the results of the treatability study for completeness and appropriateness based on the requirement for waste minimization and residuals management as well as Site-specific conditions. The study results shall indicate clearly the performance of the technology or vendor compared with the Performance Standards established for the Site. The report shall evaluate the treatment technology's effectiveness, implementability, cost, and actual results as compared with predicted results. The report shall also evaluate full-scale application of the technology, including a sensitivity analysis identifying the key parameters affecting full-scale operation. Should the results indicate that the proposed technology will meet the Performance Standards, EPA will instruct Respondents to include the Treatability Study Final Report in the Preliminary Design Report and the study results and operating conditions shall be used in the detailed design of the selected remedy. Should the treatability study not be approved by EPA, additional treatability studies may be required to fully evaluate the available treatment systems.

3.2.5 Task IV - Intermediate Design

Intermediate Design shall begin with completion of the Preliminary Design and end with the completion of approximately 60 percent of the design effort. The Intermediate Design submittal will consist of a continuation and expansion of the Preliminary Design submittal as may be modified by any value engineering recommendations adopted by the Group. Any value engineering recommendations adopted shall be summarized in a report submitted with the Intermediate Design. EPA comments on the Intermediate Design and a memorandum indicating how EPA's comments were incorporated shall be included in the Prefinal/Final Design. The Intermediate Design shall consist of the following:

1. Draft Design Analyses

The evaluations conducted to select the design approach shall be described. Design calculations shall be included.

2. Draft Plans and Specifications

Draft construction drawings and specifications for all components of the Remedial Action shall be prepared and presented. All plans and specifications shall conform with the Construction Specifications Institute Master Format.

3. Draft Construction Schedule

Respondents shall develop a Draft Construction Schedule for construction and implementation of the remedial action which identifies timing for initiation and completion of all critical path tasks. Respondents shall specifically identify dates for completion of the project and major milestones.

3.2.6 Task V - Prefinal Design

The Respondents shall submit the Prefinal Design when the design work is approximately 90 percent complete in accordance with the approved design management schedule. Respondents shall address comments generated from the Intermediate Design Review and clearly show any modification of the design as a result of incorporation of the comments. Essentially, the Prefinal Design shall function as the draft version of the Final Design. After EPA review and comment on the Prefinal Design, the Final Design shall be submitted along with a memorandum indicating how the Prefinal Design comments were incorporated into the Final Design. All Final Design documents shall be certified by a Professional Engineer registered in the State of Georgia. EPA written approval of the Final Design is required before initiating the RA, unless specifically authorized by EPA. The following items shall be submitted with or as part of the Prefinal/Final Design:

1. Complete Design Analyses

The selected design shall be presented along with an analysis supporting the design approach. Design calculations shall be included.

2. Final Plans and Specifications

A complete set of construction drawings and specifications shall be submitted which describe the selected design.

3. Final Construction Schedule

Respondents shall submit a final construction schedule to EPA for approval.

4. Construction Cost Estimate

An estimate within +15 percent to -10 percent of actual construction costs shall be submitted.

3.2.7 Task VI - Remedial Action Planning

Concurrent with the submittal of the Contingent Remedial Action Prefinal/Final Design, the Group will submit a draft Remedial Action (RA) Work Plan, a Construction Management Plan, a Construction Quality Assurance Plan, and a Construction Health and Safety Plan/Contingency Plan for the contingent remedial action. This RA Work Plan, Construction Management Plan, and Construction Quality Assurance Plan must be reviewed and approved by EPA and the Construction Health and Safety Plan/Contingency Plan reviewed by EPA prior to the initiation of the Contingent Remedial Action.

Upon approval of the Final Design and RA Work Plan, Respondents shall implement the RA Work Plan in accordance with the construction management schedule. Significant field changes to the RA as set forth in the RA Work Plan and Final Design shall not be undertaken without the approval of EPA. The RA shall be documented in enough detail to produce as-built construction drawings after the RA is complete. Deliverables shall be submitted to EPA for review and approval in accordance with section XIII of the UAO.

RA Work Plan

A Work Plan which provides a detailed plan of action for completing the RA activities shall be submitted to EPA for review and approval. The objective of this work plan is to provide for the safe and efficient completion of the RA. The Work Plan shall be developed in conjunction with the Construction Management Plan, the Construction Quality Assurance Plan, and the Construction Health and Safety Plan/Contingency Plan, although each plan may be delivered under separate cover. The Work Plan shall include a comprehensive description of the work to be performed and the Final Construction schedule for completion of each major activity and submission of each deliverable. The Work Plan shall be developed in conjunction with the Construction Management Plan, the

Construction Quality Assurance Plan, and the Construction Health and Safety Plan, although each may be delivered under separate cover.

Specifically, the Work Plan shall present the following:

i) A detailed description of the tasks to be performed and a description of the work products to be submitted to EPA. This includes the deliverables set forth in the remainder of Task III.

ii) A schedule for completion of each required activity and submission of each deliverable required by this UAO, including those in this SOW.

iii) A project management plan, including provision for monthly reports to EPA and meetings and presentations to EPA at the conclusion of each major phase of the RA. EPA's Project Coordinator and Respondents' Project Coordinator will meet, at a minimum, on a quarterly basis, unless EPA determines that such meeting is unnecessary.

iv) A description of the community relations support activities to be conducted during the RA. At EPA's request, Respondents shall assist EPA in preparing and disseminating information to the public regarding the RA work to be performed.

Project Delivery Strategy

Respondents shall submit a document to EPA for review and approval describing the strategy for delivering the project. This document shall address the management approach for implementing the Remedial Action, including procurement methods and contracting strategy, phasing alternatives, and contractor and equipment availability concerns. If the construction of the remedy is to be accomplished by Respondents' "in-house" resources, the document shall identify those resources.

Construction Management Plan

A Construction Management Plan shall be developed to indicate how the construction activities are to be implemented and coordinated with EPA during the HA. Respondents shall designate a person to be a Remedial Action Coordinator and its representative on-Site during the Remedial Action, and identify this person in the Plan. This Plan shall also identify other key project management personnel and lines of authority, and provide descriptions of the duties of the key personnel along with an organizational chart. In addition, a plan for the administration of construction changes and EPA review and approval of those changes shall be included.

Construction Quality Assurance Plan

Respondents shall develop and implement a Construction Quality Assurance Program to ensure, with a reasonable degree of certainty, that the completed Remedial Action meets or exceeds all design criteria, plans and specifications, and Performance standards. The Construction Quality Assurance Plan shall incorporate relevant provisions of the Performance Standards Verification Plan (see Task V). At a minimum, the Construction Quality Assurance Plan shall include the following elements:

i) A description of the quality control organization, including a chart showing lines of authority, identification of the members of the Independent Quality Assurance Team (IQAT), and acknowledgment that the IQAT will implement the control system for all aspects of the work specified and shall report to the project coordinator and EPA. The IQAT members shall be representatives from testing and inspection organizations and/or the supervising Contractor and shall be responsible for the QA/QC of the Remedial Action. The members of the IQAT shall have a good professional and ethical reputation, previous experience in the type of QA/QC activities to be implemented, and demonstrated capability to perform the required

activities. They shall also be independent of the construction contractor.

ii) The name, qualifications, duties, authorities, and responsibilities of each person assigned a QC function.

iii) Description of the observations and control testing that will be used to monitor the construction and/or installation of the components of the Remedial Action. This includes information which certifies that personnel and laboratories performing the tests are qualified and the equipment and procedures to be used comply with applicable standards. Any laboratories to be used shall be specified. Acceptance/Rejection criteria and plans for implementing corrective measures shall be addressed.

iv) A schedule for managing submittals, testing, inspections, and any other QA function (including those of contractors, subcontractors, fabricators, suppliers, purchasing agents, etc.) that involve assuring quality workmanship, verifying compliance with the plans and specifications, or any other QC objectives. Inspections shall verify compliance with all environmental requirements and include, but not be limited to, air quality and emissions monitoring records and waste disposal records, etc.

v) Reporting procedures and reporting format for QA/QC activities including such items as daily summary reports, schedule of data submissions, inspection data sheets, problem identification and corrective measures reports, evaluation reports, acceptance reports, and final documentation.

vi) A list of definable features of the work to be performed. A definable feature of work is a task which is separate and distinct from other tasks and has separate control requirements.

Construction Health and Safety Plan/Contingency Plan

Respondents shall prepare a Construction Health and Safety Plan/Contingency Plan in conformance with Respondents' health and safety program, and in compliance with OSHA regulations and protocols. The Construction Health and Safety Plan shall include a health and safety risk analysis, a description of monitoring and personal protective equipment, medical monitoring, and Site control. EPA will not approve Respondents' Construction Health and Safety Plan/Contingency Plan, but rather EPA will review it to ensure that all necessary elements are included, and that the plan provides for the protection of human health and the environment. This plan shall include a Contingency Plan and incorporate Air Monitoring and Spill Control and Countermeasures Plans if determined by EPA to be applicable for the Site. The Contingency Plan is to be written for the on-Site construction workers and the local affected population. It shall include the following items:

i) Name of person who will be responsible in the event of an emergency incident.

ii) Plan for initial Site safety indoctrination and training for all employees, name of the person who will give the training and the topics to be covered.

iii) Plan and date for meeting with the local community, including local, state and federal agencies involved in the cleanup, as well as the local emergency squads and the local hospitals.

iv) A list of the first aid and medical facilities including, location of first aid kits, names of personnel trained in first aid, a clearly marked map with the route to the nearest medical facility, all necessary emergency phone numbers conspicuously posted at the job site (i.e., fire, rescue, local hazardous material teams, National Emergency Response Team, etc.).

v) Plans for protection of public and visitors to the job site.

vi) Air Monitoring Plan which incorporates the following requirements:

a) Air monitoring shall be conducted both on Site and at the perimeter of the Site. The chemical constituents that were identified during the Risk Assessment shall serve as a basis of the sampling for and measurement of pollutants in the atmosphere. Respondents shall clearly identify these compounds and the detection and notification levels required in Paragraph d) below. Air monitoring shall include personnel monitoring, on-Site area monitoring, and perimeter monitoring.

b) Personnel Monitoring shall be conducted according to OSHA and NIOSH regulations and guidance.

c) On-Site Area Monitoring shall consist of continuous real-time monitoring performed immediately adjacent to any waste excavation areas, treatment areas, and any other applicable areas when work is occurring. Measurements shall be taken in the breathing zones of personnel and immediately upwind and downwind of the work areas. Equipment shall include the following, at a minimum: organic vapor meter, explosion meter, particulate monitoring equipment, and on-Site windsock.

d) Perimeter Monitoring shall consist of monitoring airborne contaminants at the perimeter of the Site to determine whether harmful concentrations of toxic constituents are migrating off Site. EPA-approved methods shall be used for sampling and analysis of air at the Site perimeter. The results of the perimeter air monitoring and the on-Site meteorological station shall be used to assess the potential for off-Site exposure to toxic materials. The air monitoring program shall include provisions for notifying nearby residents, local, state and federal agencies in the event that unacceptable concentrations of airborne toxic constituents are migrating off Site. Respondents shall report

detection of unacceptable levels of airborne contaminants to EPA in accordance with Section XII of the UAO.

vii) A Spill Control and Countermeasures Plan which shall include the following:

a) Contingency measures for potential spills and discharges from materials handling and/or transportation.

b) A description of the methods, means, and facilities required to prevent contamination of soil, water, atmosphere, and uncontaminated structures, equipment, or material by spills or discharges.

c) A description of the equipment and personnel necessary to perform emergency measures required to contain any spillage and to remove spilled materials and soils or liquids that become contaminated due to spillage. This collected spill material must be properly disposed of.

d) A description of the equipment and personnel to perform decontamination measures that may be required for previously uncontaminated structures, equipment, or material.

4.0 REMEDIAL ACTION TASKS

4.1 SELECTED REMEDY

Based upon consideration of the requirements of CERCLA, the NCP, the detailed analysis of alternatives and public and state comments, the EPA Selected Remedy consists of program of institutional controls, groundwater monitoring, and a contingent groundwater treatment remedial action for this Site. The remedial actions to be performed as part of the Selected Remedy include the following tasks:

i) landfill cover maintenance and seep control activities;
ii) groundwater monitoring and sampling; and
iii) surface water sampling.

The schedule for these remedial action tasks is presented on Figure 9.1, while the following subsections provide a description of typical activities to be performed in conjunction with each task.

4.1.1 Landfill Cover Maintenance and Seep Control

The CML Site was closed in 1979. Site inspections performed during the RI indicated that the cover was in good repair, most of the Site was well vegetated and only one leachate seep was found. As a result of the stability of the CML Site, landfill cover maintenance and seep control activities will be performed on a semi-annual basis for the duration of the RD/RA program. This task includes performing a reconnaissance survey of the entire Site to ensure that conditions do not arise which may pose a threat to human health of the environment. The semi-annual inspections will be performed by the City of Cedartown staff. The primary objectives of this task are:

i) to confirm that the integrity of the landfill cover is maintained such that landfill refuse is not exposed at the ground surface; and

ii) to record and report any uncontrolled leachate seeps discharging to the surface.

On-Site conditions which may require mitigative procedures include, but are not restricted to, the following items:

- erosion of the landfill cover which may expose refuse;
- erosion of the landfill cover which may create side slope instability;
- uncontrolled hazardous leachate discharge to mobile surface water;
- areas where vegetation is sparse or unsuccessful; and
- surface staining caused by leachate discharge.

Conditions such as those mentioned above should be noted on specific inspection forms (to be provided by CRA) during the Site reconnaissance survey and should be reported to CRA whereby mitigative procedures, when necessary, will be initiated. The results of the Site reconnaissance survey will be reported by CRA in the appropriate monthly progress reports.

4.1.2 Groundwater Monitoring and Sampling

Perimeter Wells

The purpose of the groundwater monitoring program is to evaluate the impact of the landfill, if any, on the downgradient water quality. The groundwater monitoring and sampling program will be conducted over a five (5)-year period, during which samples will be collected quarterly for the first two (2) years, followed by semi-annual sampling for an additional three (3) years, if required. The schedule of any further monitoring will be determined in conjunction with USEPA. The location of the ten (10) perimeter monitoring wells scheduled for monitoring, as indicated on Figure 4.1, are such that wells CL-09-WP, OW-6B, and the proposed monitoring well OW-7 are located upgradient of the landfill while the remaining wells are located downgradient from the Site. Each of the

groundwater monitoring wells is completed in the limestone bedrock as noted in the well construction details in Table 4.1.

During each groundwater sampling round, the groundwater level will be recorded prior to sampling, the field parameters (pH, conductivity, temperature and turbidity) will be measured, and a groundwater sample will be collected for laboratory analysis. In order to reduce the suspended particulate matter in the groundwater samples, a low flow purging technique will be utilized. The SOPs for monitoring, purging and sampling each well are described in the FSP (Submittal A1 of Appendix A). Each groundwater sample collected will be analyzed for five (5) groundwater contaminants of concern; beryllium, cadmium, chromium, lead, and manganese. The analytical methods used for analyzing the groundwater samples are described in the QAPP (Submittal A2 of Appendix A). The records and reporting of the groundwater monitoring and sampling program will be kept in accordance with the Project Management Plan as described in Section 7.).

After the initial two (2) years of the groundwater sampling program, the data will be reviewed by the EPA and CRA to determine whether the established groundwater Performance Standards continue to be appropriate and to determine the effectiveness of natural attenuation of these contaminants. Based on this review, the need for contingent groundwater treatment remedy will be evaluated as discussed in Section 6.

Interior Wells

Three (3) interior wells will be sampled during the groundwater monitoring program to verify the effectiveness of natural attenuation of the metals listed above. The data generated during the interior well sampling program, however, will not be used in the assessment of any further potential remedial actions.

The interior wells will be sampled on a quarterly basis for the first year of sampling and on a semi-annual basis for the following year. The frequency of the interior well sampling program for the last three years of

the five-year period will be consistent with the sampling frequency of the perimeter well program for this period.

The location of the interior wells scheduled for monitoring is shown on Figure 4.1.

The interior wells will be sampled and analyzed for the same parameters as the perimeter wells. Hydraulic monitoring and field sampling will also be conducted in accordance with the program outlined above for the perimeter wells.

4.1.3 Surface Water Sampling

The purpose of the surface water sampling program is to evaluate the impact, if any, of the east seep on the water quality in the Coke Pond. Surface water samples will be collected from the Coke Pond over a five (5)-year period, during which quarter-annual samples will be collected for the first two (2) years followed by semi-annual sampling for the remaining three (3) years. The location of the surface water sampling point is indicated on Figure 4.1. The SOPs for collecting a surface water sample is described in the FSP (Submittal A1 of Appendix A). Each surface water sample will be analyzed for parameters indicative of leachate impact from the east seep. These parameters include aluminum, chromium, copper, lead, nickel, and zinc. The analytical methods used for analyzing the surface water samples are described in the QAPP (Submittal A2 of Appendix A). After five (5) years of sampling, the EPA will conduct a Five-Year Review to re-evaluate the potential of contaminant migration from the landfill seep(s) to the Coke Pond. EPA may at its sole discretion discontinue sampling at this time. The records and reporting of the surface water sampling program shall be performed in accordance with the Project Management Plan as described in Section 7.

4.1.4 Remedial Action Report

As provided in Section IX of the UAO, within 30 days after Respondents conclude that the Remedial Action has been fully performed and the Performance Standards have been attained, Respondents shall so certify to the United States and shall schedule and conduct a pre-certification inspection to be attended by EPA and Respondents. If after the pre-certification inspection Respondents still believe that the Remedial Action has been fully performed and the Performance Standards have been attained, Respondents shall submit a Remedial Action (RA) Report to EPA in accordance with Section IX of the UAO. The RA Report shall include the following:

1. Synopsis of the work defined in the SOW and the demonstration in accordance with the Performance Standards Verification Plan that Performance Standards have been achieved;

2. Certification that the Remedial Action has been completed in full satisfaction of the requirements of the UAO, and;

3. A description of how Respondent will implement any remaining part of the EPA approved Operation and Maintenance Plan.

After EPA review, Respondents shall address any comments and submit a revised report. As provided in Section IX of the UAO, the Remedial Action shall not be considered complete until EPA approves the RA Report.

5.0 OPERATION AND MAINTENANCE PLAN

5.1 SELECTED REMEDY

The operation and maintenance program, as presented herein, was developed for the ongoing Selected Remedy components. The following section describes the ongoing remedial activities, potential problems associated with these activities and the corrective actions required to avoid or mitigate them. All operation and maintenance activities are to be performed in accordance with the Site Health and Safety Plan as provided in Appendix B.

5.1.1 Landfill Cover Maintenance and Seep Control

The integrity of the landfill cover and the presence/absence of uncontrolled leachate seeps shall be confirmed during the semi-annual Site reconnaissance survey. Landfill cover deficiencies due to slope failure and/or erosion will be mitigated by regrading and/or repacking the cover area to remove the potential for refuse exposure at the ground surface. The landfill cover shall be restored such that a minimum cover of 3 feet is maintained in the problem areas.

If a surface seep is discovered, the discharging fluid will be sampled and analyzed for the surface water contaminants of concern. Once it has been established that the leachate seep poses a potential threat to human health and/or the environment, the appropriate remedial alternative will be determined. Leachate seeps which may adversely impact human health or the environment will be mitigated by one of the following alternatives:

i) repacking and/or regrading the landfill cover at the seeps location; or
ii) installing a toe-drain to transport the leachate to a collection system.

The selection of the appropriate remedial alternative will be based on the location of the seep, the chemistry of the leaching fluid and the potential impacts to human health and the environment. The selected leachate seep

mitigative alternative, as determined by CRA and approved by the EPA, will be described in detail in a technical memorandum to be submitted to the Group two weeks after the seep is located.

5.1.2 Groundwater Monitoring and Sampling

The O&M activities associated with groundwater monitoring and sampling involve cleaning and calibration of the monitoring, purging and sampling equipment (e.g., water tape, pumps, meters, etc.). The SOPs for cleaning and calibrating the field equipment is described in Appendix A - Sampling and Analysis Plan.

6.0 PERFORMANCE STANDARDS VERIFICATION PLAN

6.1 GENERAL

The following section of the RD/RA Work Plan presents the proposed plan to ensure that the specified groundwater Performance Standards are met. Compliance with the Performance Standards will be determined by means of groundwater and surface water sampling as described in Section 4.1.2. The sampling procedures to be followed are described in the FSP present in Submittal A1 of Appendix A. The QA/QC protocols to be used in the Performance Standards verification monitoring are presented in the QAPP (Submittal A2 of Appendix A).

The following sub-sections present the tasks to be performed by the Group to demonstrate the validity of and/or compliance with the Performance Standards.

6.2 PERFORMANCE STANDARDS

6.2.1 Groundwater

As previously described, the results of the RI indicated that potential future exposure may present an unacceptable excess cancer risk or non cancer hazards. As a result USEPA developed groundwater Performance Standards for the chemicals of concern. Groundwater Performance Standards are presented in Table 2.7. At the Site, background concentrations of some chemicals of concern may actually be higher than the Performance Standards. Additional groundwater sampling will be performed and the data evaluated, as described in Section 6.3, to determine background conditions.

6.2.2 Surface Water

The surface water analyses obtained during the RA will be compared to the appropriate Federal Ambient Water Quality Criteria or more stringent Georgia Surface Water Quality Standard. The proposed surface water quality Performance Standards are listed in Table 2.8.

6.3 DATA EVALUATION TASKS

6.3.1 Groundwater

Following the completion of eight quarters of groundwater monitoring and analysis, the Group will determine the background concentrations of the contaminants of concern (COC) and evaluate the appropriateness of the groundwater Performance Standards. Based on this evaluation, the Group will make a recommendation to EPA on the appropriateness of the Performance Standards. EPA will then determine the appropriateness of the Performance Standards.

A statistical evaluation procedure, similar to that recommended for a RCRA facility, will be used to determine the COC background concentrations and compare downgradient wells to Performance Standards or background concentrations. The proposed statistical procedures discussed below are outlined in a flow chart depicted in Plan 1 (in pocket). These statistical procedures will be applied to the three upgradient and seven downgradient monitoring wells.

If during the statistical evaluation it is discovered that the statistical methods described in the following sections are not appropriate, alternate methods may be applied. The alternate method(s) will be consistent with USEPA Method as defined in USEPA, 1989 and will be approved by the RPM prior to use.

6.3.1.1 Determination of the Appropriateness of the Performance Standards

The appropriateness of the Performance Standards will be assessed by comparing background concentrations to the groundwater Performance Standards values for each chemical of concern. For a Performance Standard to remain valid it should be greater than the background concentration for the Site. A confidence interval approach will be used, and is the recommended statistical procedure for comparing a monitoring well with a fixed limit (USEPA, 1989). The 95 percent upper confidence limit (UCL) will be compared to the Performance Standard using the student-t test. This test will determine if the mean of the pooled background COC concentration is significantly less than or greater than the Performance Standard. The mathematical basis for the calculation is as follows:

The data from the background wells will be pooled and the mean ($\bar{X}$) and variance (S_X^2) of the background data is calculated as,

$$\overline{X} = \frac{X_1 + X_2 + \ldots + X_N}{N}$$

$$S_X^2 = \frac{(X_1 - \overline{X})^2 + (X_2 - \overline{X})^2 + \ldots + (X_N - \overline{X})^2}{(N-1)}$$

where: X_N = monitoring data value N for background concentration of the specific COC

N = number of background samples

The t-statistic, t^*, is calculated as

$$t^* = \frac{\bar{X} - PS}{\frac{S}{\sqrt{N}}}$$

where: PS = groundwater Performance Standard for the COC

S = standard deviation

If the background analytical data do not have a normal distribution, the logarithm of the data will be used to develop lognormal confidence limits.

The critical comparison statistic, t_C, is selected from the student-t table for (N-1) degrees of freedom and a 5 percent level of significance. The t-statistic, t^*, is compared to t_C with the following decision rules:

i) if t^* is positive and equal to or larger than t_C, then the mean background value of the specific COC is significantly greater than the Performance Standard at the 5 percent level and the Performance Standard is not appropriate;

ii) if t^* is negative and the absolute value is equal to or larger than t_C, then the mean background value of the specific COC is significantly less than the Performance Standard at the 5 percent level and the Performance Standard is appropriate; and

iii) if the absolute value of t^* is less than t_C, then it is concluded that there is no significant difference between the mean value of the specific COC and the Performance Standard. In this case there is no indication that the Performance Standard is significantly less than the background concentration and the Performance Standard would be considered inappropriate.

The preceding analysis will result in a decision of either appropriate or inappropriate Performance Standards on an individual COC basis. It may be the case that certain Performance Standards will be applicable for some COCs and that others will not. The results of the evaluation of the appropriateness of the Performance Standards will be provided to USEPA in the Two-Year Review report described in Section 6.4 for their review and approval.

6.3.1.2 Evaluate Downgradient Water Quality vs. Specific Performance Standards

The COCs for which the Performance Standards are valid will be evaluated individually in each of the seven downgradient wells using the confidence interval approach described above, with the following decision rules:

i) if t^* is positive and equal to or larger than t_C, then the mean downgradient value of the specific COC is significantly greater than the Performance Standard at the 5 percent level;

ii) if t^* is negative and the absolute value is equal to or larger than t_C, then the mean downgradient value of the specific COC is significantly less than the Performance Standard at the 5 percent level; and

iii) if the absolute value of t^* is less than t_C, then it is concluded that there is no significant difference between the mean value of the COC and the Performance Standard.

As in the case for the upgradient wells, if the analytical data for a specific COC at an individual wells does not have a normal distribution, then a lognormal approach will be used.

Performance Standards Met

If the water sampling data reveals that the downgradient water quality is less than Performance Standards or that there is no statistically significant difference between the downgradient water quality and the Performance Standards then the groundwater sampling program will continue as follows:

- samples will be collected on a semi-annual basis;
- sampling data will be re-evaluated after each sampling round; and
- monitoring wells having non-detectable levels of each COC during a one-year sampling period will be recommended for removal from the

sampling program. (EPA will determine the appropriateness of amending the sampling program.)

This program will continue until the EPA approves a five-year review concluding that the selected remedy has achieved continued attainment of the Performance Standards and remains protective of human health and the environment.

Performance Standards Exceeded

If the evaluation noted above indicates that a downgradient well contains a specific COC concentration which is statistically significantly greater than Performance Standard, the trend in the well chemistry will be evaluated. This trend evaluation will note if substantial increases above the Performance Standard occurred in two consecutive rounds, or if the trend is decreasing and Performance Standards are likely to be met within five years of the two-year review. The results of this evaluation will be reported to USEPA and the need for contingent remedial action will be assessed. The sampling program will be continued to confirm the trend evaluation.

6.3.1.3 Evaluate Downgradient Water Quality vs. Background Water Quality

For those COCs whose Performance Standards are determined by EPA to be inappropriate, EPA will modify the Performance Standards to reflect the background COC concentration through an Explanation of Significant Differences (ESD) or ROD Amendment. In this case, those COCs in each of the downgradient wells will be compared to pooled upgradient concentration data to determine if the downgradient water quality is significantly affected by the Site. For this type of comparison, confidence intervals are not an appropriate statistical methodology (USEPA, 1992). Instead, the determination of whether downgradient chemical concentrations are statistically significantly increased by the Site will be undertaken using Cochran's Approximation to the Behrens-Fisher t-test (McBean et al., 1988). The evaluation will be carried out for each location by

comparing background conditions to the downgradient monitoring results. The mathematical basis for the calculations is as follows.

The mean ($\bar{Y}$) and variance (S_Y^2) of each COC where Performance Standards are inappropriate in each downgradient well is calculated as,

$$\overline{Y} = \frac{Y_1 + Y_2 + \ldots + Y_M}{M}$$

$$S_Y^2 = \frac{(Y_1 - \overline{Y})^2 + (Y_2 - \overline{Y})^2 + \ldots + (Y_M - \overline{Y})^2}{(M-1)}$$

where: Y_M = downgradient monitoring data value
M = number of downgradient samples

The t-statistic, t^*, is calculated as

$$t^* = \frac{\overline{Y} - \overline{X}}{\sqrt{\frac{S_X^2}{N} + \frac{S_Y^2}{M}}}$$

The critical comparison statistic, t_C, is calculated as a weighted function of the background and downgradient data as follows:

$$t_c = \frac{W_X t_X + W_Y t_Y}{W_X + W_Y}$$

$$W_X = \frac{S_X^2}{N} \quad ; \quad W_Y = \frac{S_Y^2}{M}$$

where: W_X = Weighting factor for background data
W_Y = Weighting factor for downgradient data
t_X = student-t table value for (N-1) degrees of freedom and 5 percent level of significance
t_Y = student-t table value for (M-1) degrees of freedom and 5 percent level of significance

The t-statistic, t^*, is compared to the critical t-statistic, t_C, with the following decision rules:

i) if t^* is positive and equal or larger than t_C then there is a statistically significant increase in the downgradient concentration of the specific COC at the 5% level; or,

ii) if t^* is negative and the absolute value is equal or larger than t_C then there is a statistically significant decrease in the downgradient concentration of the specific COC at the 5% level; and

iii) if the absolute value of t^* is less than t_C then it is concluded that there has not been a statistically significant change in the concentration of the specific COC.

Performance Standards Met

If the data evaluation reveals that the water quality has either improved or that there is no statistically significant change in the water quality, then the groundwater sampling program will continue as follows:

- sampling will be conducted on a semi-annual basis;
- sampling data will be reevaluated after each sampling round; and
- monitoring wells having non-detectable levels of each COC during a one-year sampling period will be removed from the sampling program.

This program will continue until the EPA approves a five-year review concluding that the selected remedy has achieved continued attainment of the Performance Standards and remains protective for human health and the environment.

Performance Standards Exceeded

If the evaluation noted above indicates that downgradient water quality is significantly increased with respect to background an evaluation of the trend in chemistry will be performed. This trend evaluation will note if substantial increases above the background concentration occurred in two consecutive rounds or if the trend is decreasing

and the background levels are likely to be met within five years of the two-year review. The results of this evaluation will be provided to USEPA and the need for contingent remedial action will be evaluated. The sampling program will be continued to confirm the trend evaluation.

6.3.2 Surface Water

Following the completion of eight quarters of surface water sampling from the Coke Pond, the Group will evaluate the water quality data to determine what impact, if any, the east seep has on the water quality of the Coke Pond. The surface water will be assessed using the confidence interval approach (as described in Section 6.3.1) comparing the surface water quality data to the proposed surface water Performance Standards.

6.3.2.1 Evaluate Surface Water Quality vs. Proposed Performance Standards

The specific surface water COCs will be evaluated individually using the confidence interval approach with the following decisions rules:

i) if t^* is positive and equal or larger than t_C then the mean value of the specific COC is significantly greater than the Performance Standards at the 5% level;

ii) if t^* is negative and the absolute value is equal or larger than t_C, then the mean value of the specific COC is significantly less than the Performance Standard at the 5% level;

iii) if the absolute value of t^* is less than t_C then it is concluded that there is no significant difference between the mean value of the specific COC and the Performance Standards.

Performance Standards Met

If the data evaluation reveals that the surface water quality meets the proposed Performance Standards or that there is no statistically significant difference between the proposed Performance Standard and the surface water quality, then the sampling program will continue as follows:

- samples will be collected on a semi-annual basis; and
- sampling data will be re-evaluated after each sampling round.

This program will continue until the EPA approves a five-year review concluding that contamination from the east seep is not migrating to the Coke Pond.

Performance Standards Exceeded

If the evaluation noted above indicates that the surface water in the Coke Pond contains a specific COC concentration which is statistically significantly greater than the proposed Performance Standard, the impact of the east seep on the Coke Pond and the potential hazards to human health and the environment will be re-assessed. Additional seep control action may be required to mitigate the situation. The sampling program will be continued to confirm the data evaluation.

6.4 TWO-YEAR REVIEW REPORT

The results of the two-year review will be presented in a report. This report will be submitted in accordance with the schedule of activities presented on Figure 9.1.

The two-year review report will contain the following:

i) a summary of all groundwater and surface water sampling activities;

ii) a summary of all groundwater and surface water analyses including data validation;

iii) the results of all statistical analyses;

iv) a determination of the appropriateness of the groundwater Performance Standards and, if required, a recommendation for modified Performance Standards;

v) the results of the comparison of downgradient groundwater chemistry to Performance Standards or background water quality, as appropriate;

vi) the results of any trend evaluation performed; and

vii) recommendations for modifications to the monitoring program, if any.

Subsequent evaluations following the two-year review will be made in the Annual Reports.

Following the completion of the Two-Year Review Report, the Group may ask the EPA to re-evaluate the Site based on the results of the sampling and analysis program. If it is determined that the releases from the Site pose no significant threat to public health or the environment, then the Group will request that the Site be deleted from the National Priority List (NPL) such that no further remedial measures are required (in accordance with the NPL deletion criteria described in Section 300.425(a) of the National Oil and Hazardous Substances Pollution Contingency Plan).

7.0 PROJECT MANAGEMENT PLAN

7.1 GENERAL

In order to ensure that the RD/RA proceeds expediently and the associated documents are complete and accurate, general specifications for the overall project management of the RD/RA have been developed. The following subsections present the project organization, data management plan (including document control) and the provisions for monthly and annual reports.

7.2 PROJECT ORGANIZATION AND RESPONSIBILITY

The USEPA, Region IV, is the lead agency for the CML Site's RD/RA and will approve associated work, as required, prior to implementation. The Group is responsible for attaining the overall objectives for management of the Principal Contractor (CRA). CRA has the overall responsibility for conducting the RD/RA tasks. The general responsibilities of the key organizations involved are described below:

i) USEPA, Region IV - Project Coordinator - Annie M. Godfrey, P.E.

- a) oversee the RD/RA to ensure compliance with the UAO and applicable regulations,
- b) approves associated work plans and reports, as appropriate,
- c) coordinates activities with the local community and support agencies, and
- d) approves supervising contractor, construction contractor, and laboratories;

ii) Cedartown Municipal Landfill Site Group - Project Coordinator - David Johnson

- a) oversees the project to ensure that the Group's objectives are met,
- b) participates in key negotiations with the USEPA,

c) provides managerial guidance, relative to the RD/RA, to the Principal Contractor, and
d) participate in selection of analytical laboratories;

iii) Principal Contractor - Conestoga-Rovers & Associates

a) develops required deliverables,
b) performs or supervises work associated with the RD/RA,
c) procures subcontractors, as directed and approved by the Group, as required for implementation of the RD/RA tasks, and
d) manages RD/RA as described in the QAPP (Submittal A1 of Appendix A); and

iv) Subcontractors

a) provides project management for their respective responsibilities.

7.3 DATA MANAGEMENT PLAN

Documents and information associated with the RD/RA for the CML Site may be used as possible evidence in any court proceedings and as the basis upon which government officials will make decisions regarding the protection of human health and the environment. Therefore, these documents must be readily accessible and the integrity and accuracy of these documents must be maintained.

The Data Management Plan (DMP) presented in Appendix C identifies the procedures to be employed for managing all data, information, reports and correspondence (documents), including document conditions associated with the RD/RA for the CML Site.

7.4 MONTHLY PROGRESS REPORTS

Monthly progress reports will be submitted to the USEPA Project Coordinator, by the fifth day of each month, as required by paragraph XIV of the UAO. As a minimum, the monthly progress reports will include the following items:

i) describe the actions which have been taken to comply with this Order during the prior month;

ii) include all results of sampling and tests and all other data received by Respondents for work required by the SOW and not previously submitted to EPA;

iii) include all plans, reports, deliverables, and procedures complete under the Work Plans during the previous month;

iv) describe all work planned for the next month with schedules relating such work to the overall project schedule for RA completion; and

v) describe all problems encountered and any anticipated problems, any actual or anticipated delays, and solutions developed and implemented to mitigate or address any actual or anticipated problems or delays.

7.5 ANNUAL REPORTS

The Group shall submit each year, within thirty (30) days of the anniversary of the effective date of this Order, a summary report to EPA setting forth the status of the Work which shall at a minimum include a statement of tasks accomplished in the preceding year, a statement of tasks remaining to be accomplished, and provide a schedule for implementation of the remaining Work.

7.6 MEETINGS /PRESENTATION WITH USEPA

The Group and CRA are prepared to meet with USEPA as appropriate during the RD/RA. As this time the need is seen for one meeting/presentation with USEPA. This meeting is proposed following the submission of the two year review report as described in Section 6.4. This report will present the data necessary to determine if the Performance Standards presented in Section 6.2 are valid.

If other meetings are required, they will be scheduled accordingly.

8.0 COMMUNITY RELATIONS SUPPORT

The Site Group is committed to supporting USEPA's community relations program for the RD/RA to be conducted at the CML Site.

As USEPA has assumed the lead position on all community relations activities, the Committee will provide technical support to USEPA at all public meetings. The Committee will provide assistance to USEPA through its Project Coordinator. Assistance will include the provision of information to be used in community relations efforts and technical representation at public meetings and information sessions by personnel familiar with the RD/RA activities to be conducted.

USEPA will have overall authority for coordinating community relations activities and ensuring that the public is kept informed and has the opportunity to review information and comment during the progress of the RD/RA. The community relations activities to be conducted by USEPA will:

1) familiarize area residents with the RD/RA process;

2) keep area residents and other interested parties informed of the RD/RA activities to be conducted, especially with regard the on-Site activities;

3) provide a mechanism for input to the RD/RA;

4) provide a channel of communication for responding to Site-specific contamination issues; and

5) ensure that all regulatory requirements concerning community relations are met.

All documents pertinent to the RD/RA will be placed in an Information Repository located at the Cedartown Public Library (245 East Avenue, Cedartown, Georgia 30125).

9.0 SCHEDULE

Figure 9.1 presents a preliminary schedule for the RD/RA activities for the Selected Remedy. The schedule includes time frames for the submittal of document packages for the Agencies review and approval.

Based upon the review of the Selected Remedy schedule, the following major milestones were identified along with their initial submission data:

i)	Submission of RD/RA Work Plan	July 7, 1994
ii)	Initial Round of Groundwater Sampling	60 days from the approval of the RD/RA Work Plan
iii)	Submission of Two-Year Review Report	26 months from the approval of the RD/RA Work Plan

The scheduling of field activities are subject to the Contractor availability and weather conditions and may be modified as approved by USEPA. In addition, the timing for the decommissioning of the existing wells is very sensitive to the field conditions, some modification of the schedule may be required if unforeseen difficulties are encountered.

The preliminary schedule for the RD/RA activities of the contingent groundwater treatment remedial action, if implemented, is presented on Figure 9.2. This schedule is based primarily on the milestone dates provided in Section VIII of the UAO. The actual schedule may be modified based on the data collection activities that are identified in the initial data review.

REFERENCES CITED

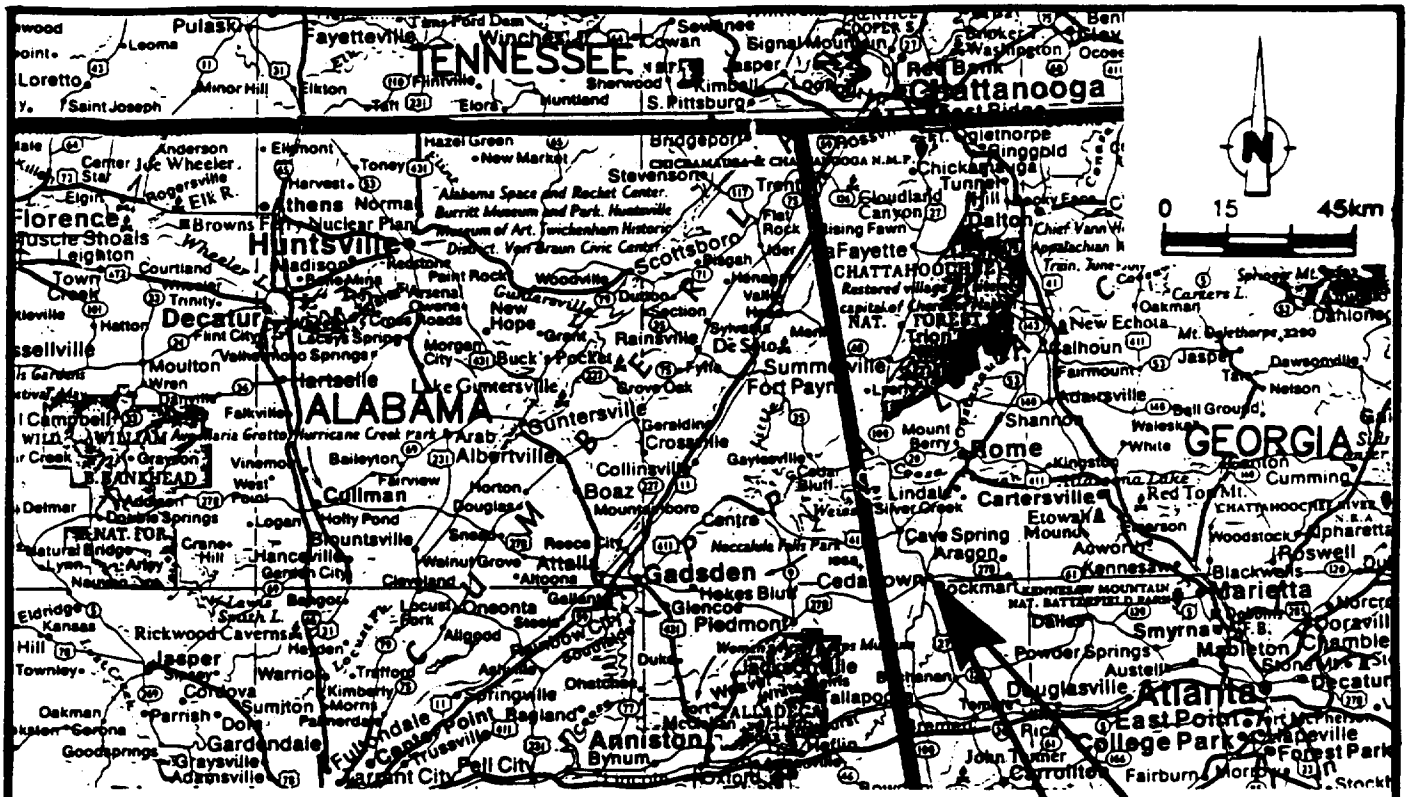
U.S. EPA (1989) Statistical Analysis of Ground-Water Monitoring Data at RCRA Facilities. Interim Final Guidance, Office of Solid Waste, Waste Management Division, April.

U.S. EPA (1992) Statistical Analysis of Ground-Water Monitoring Data at RCRA Facilities. Addendum to Interim Final Guidance, Office of Solid Waste, Permits and State Programs Division, July, 84p.

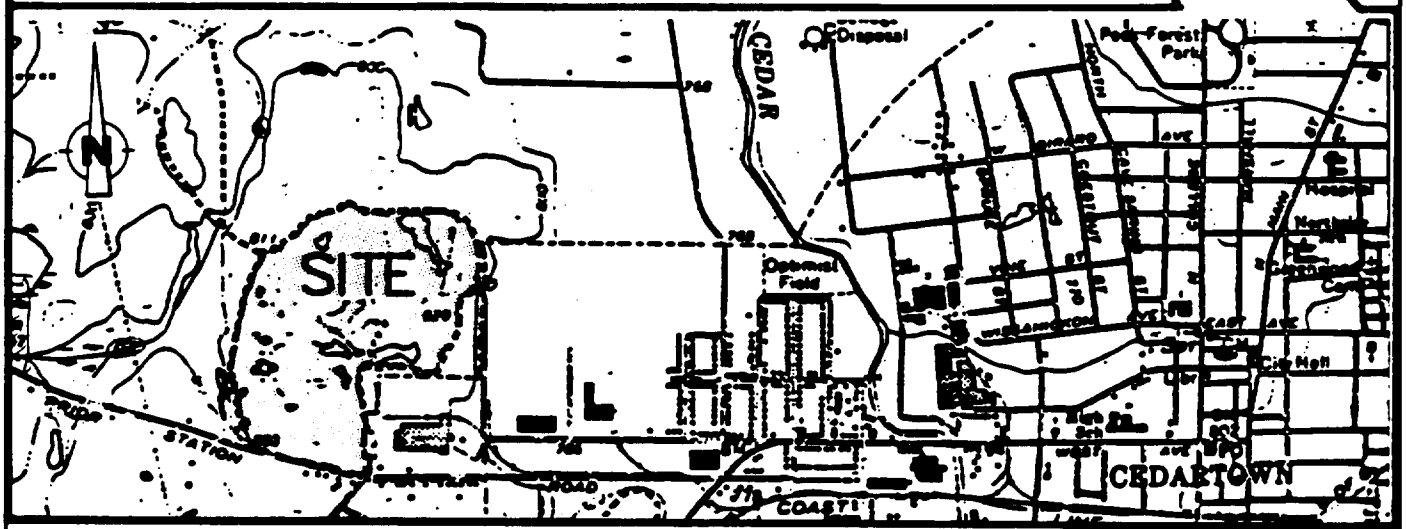
Dragun, J. (1988), The Soil Chemistry of Hazardous Materials, The Hazardous Materials Control Research Institute, Silver Spring, Maryland.

McBean, E.A., Kompter, M. and Rovers, F. (1988), A Critical Examination of Approximations Implicit in Cochran's Procedure, Groundwater Monitoring Review (GWMR), Winter.

FIGURES



SOURCE: CLOSE–UP U.S.A.
NATIONAL GEOGRAPHIC SOCIETY

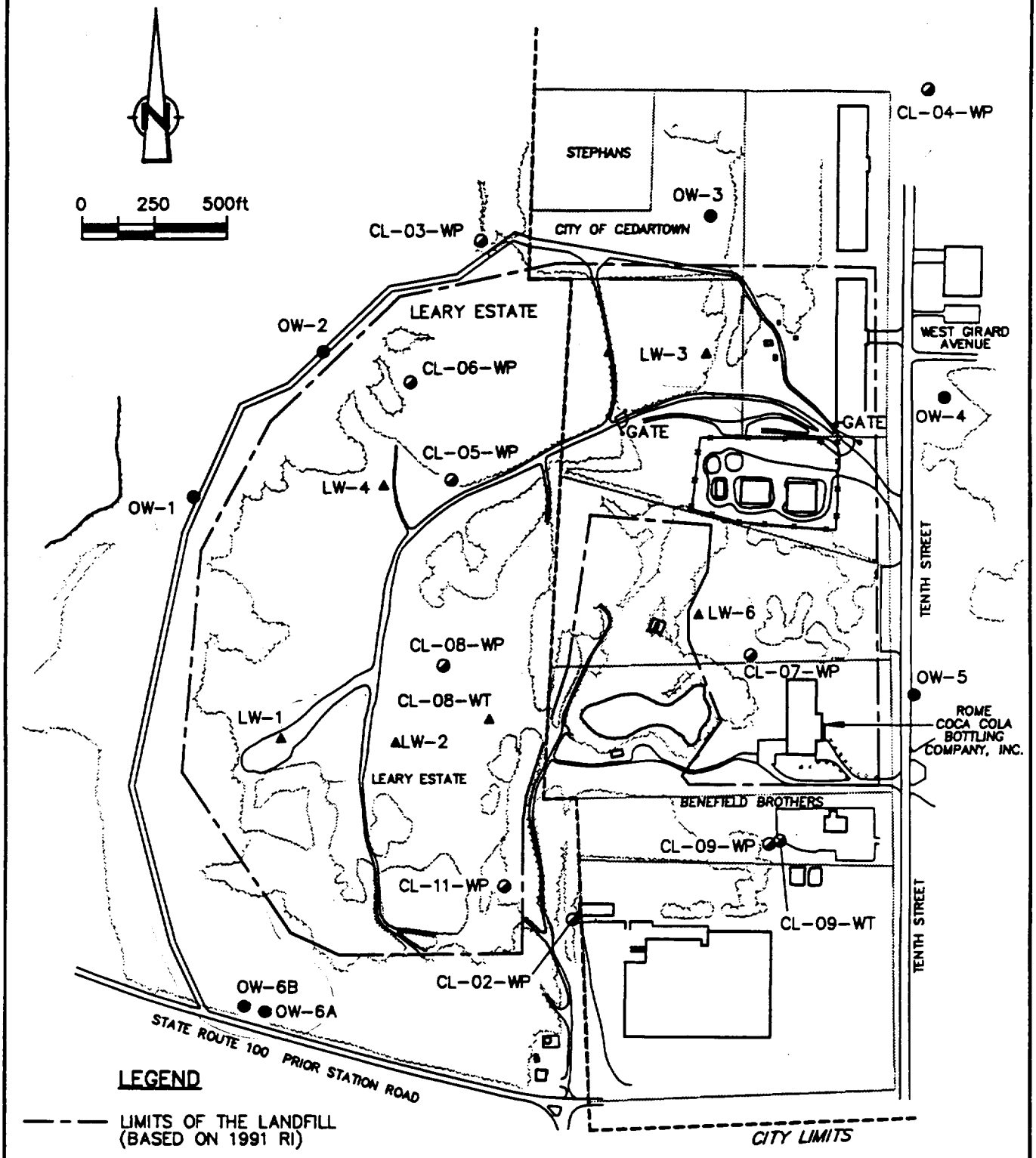


SOURCE: USGS QUADRANGLE MAP
CEDARTOWN WEST, GA.

figure 2.1

SITE LOCATION
CEDARTOWN MUNICIPAL LANDFILL SITE
Cedartown, Georgia

CRA



CRA

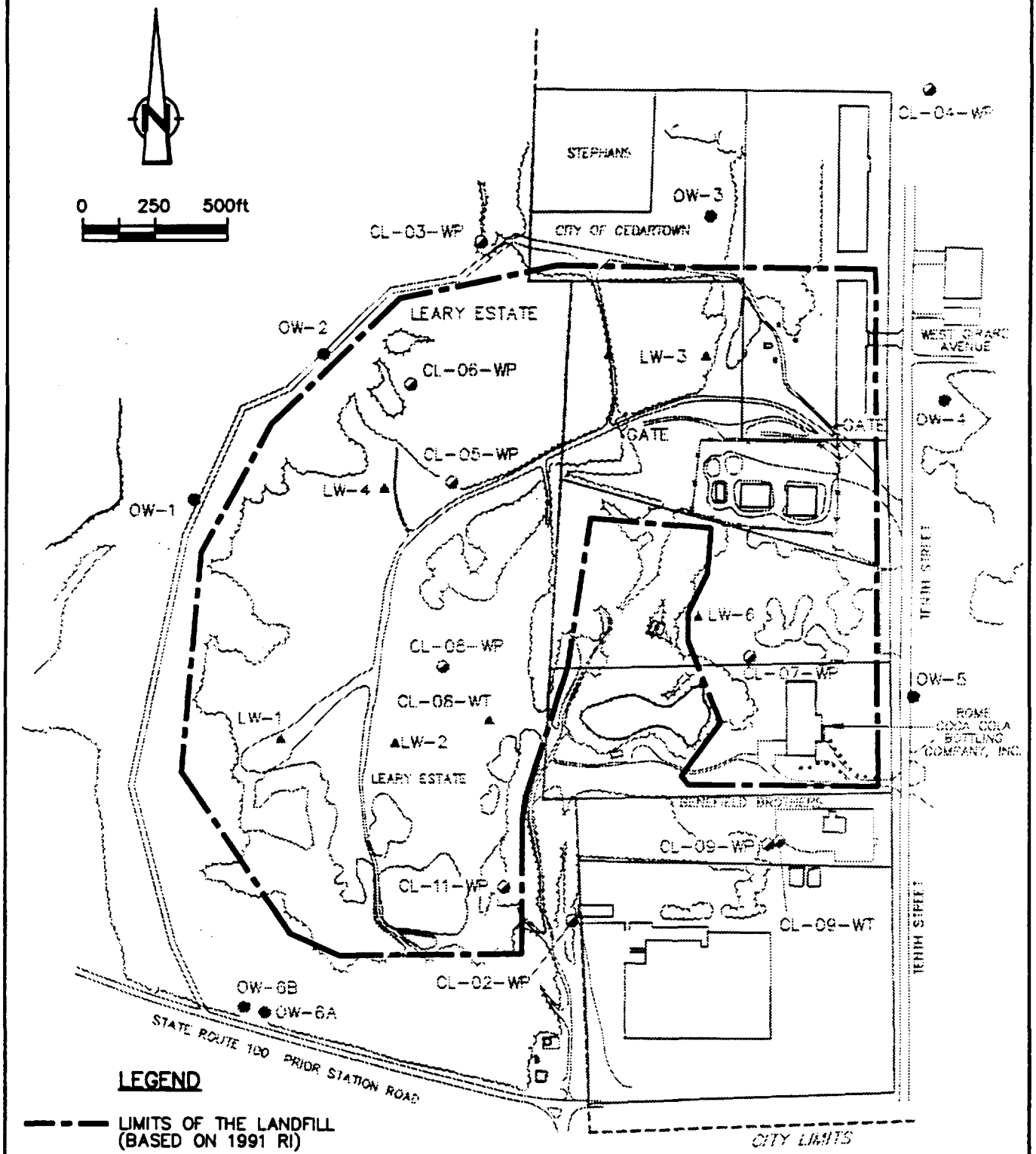
figure 2.2

SITE PLAN

CEDARTOWN MUNICIPAL LANDFILL SITE

Cedartown, Georgia

3482 (9) JULY 05/94(W) REV.0 (P-25)



CRA

figure 2.3

LIMITS OF THE LANDFILL
CEDARTOWN MUNICIPAL LANDFILL SITE
Cedartown, Georgia

3482 (9) JULY 06/94(W) REV.0 (P-26)

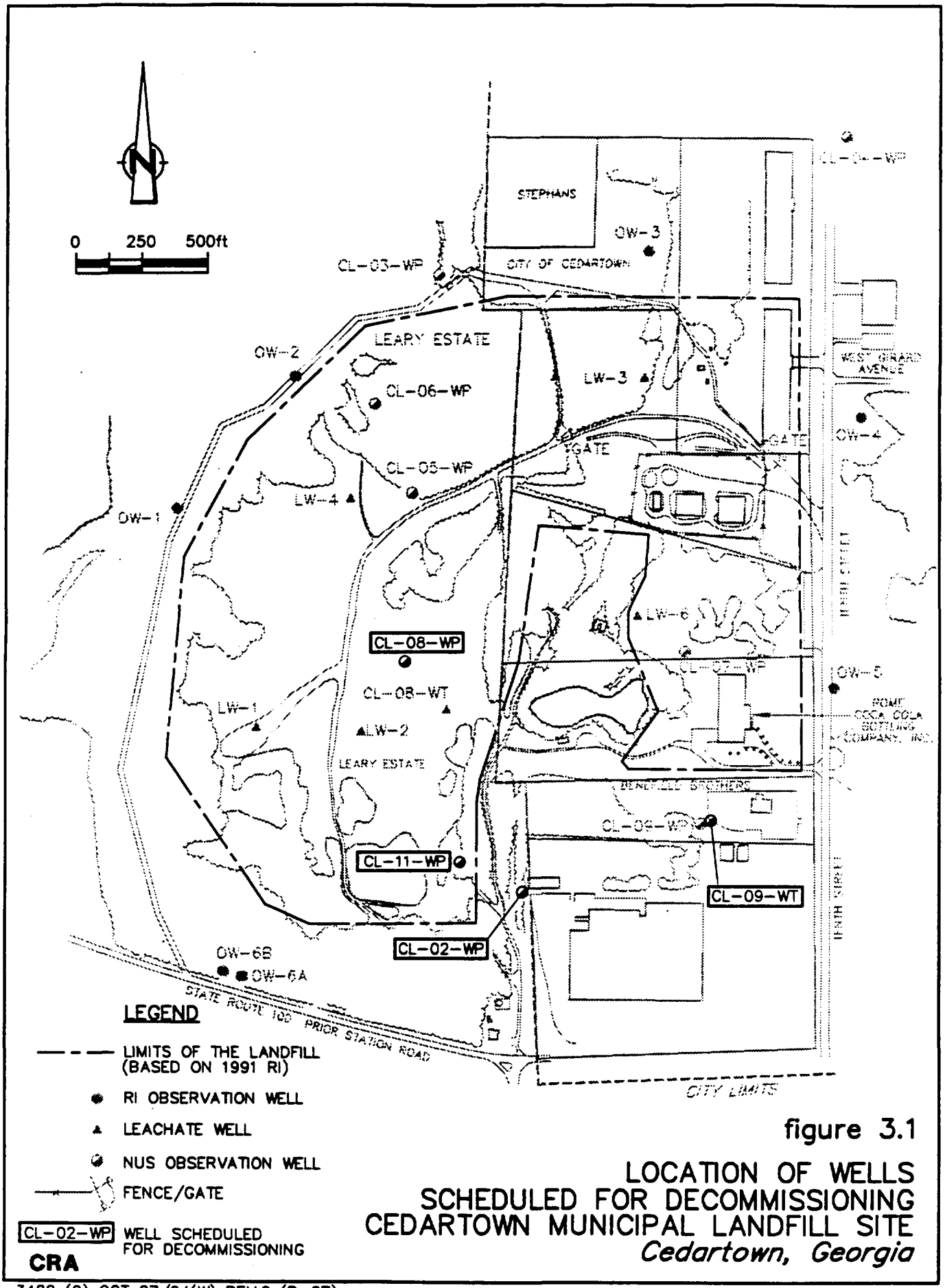


figure 3.1

LOCATION OF WELLS
SCHEDULED FOR DECOMMISSIONING
CEDARTOWN MUNICIPAL LANDFILL SITE
Cedartown, Georgia

3482 (9) OCT 27/94(W) REV.2 (P-27)

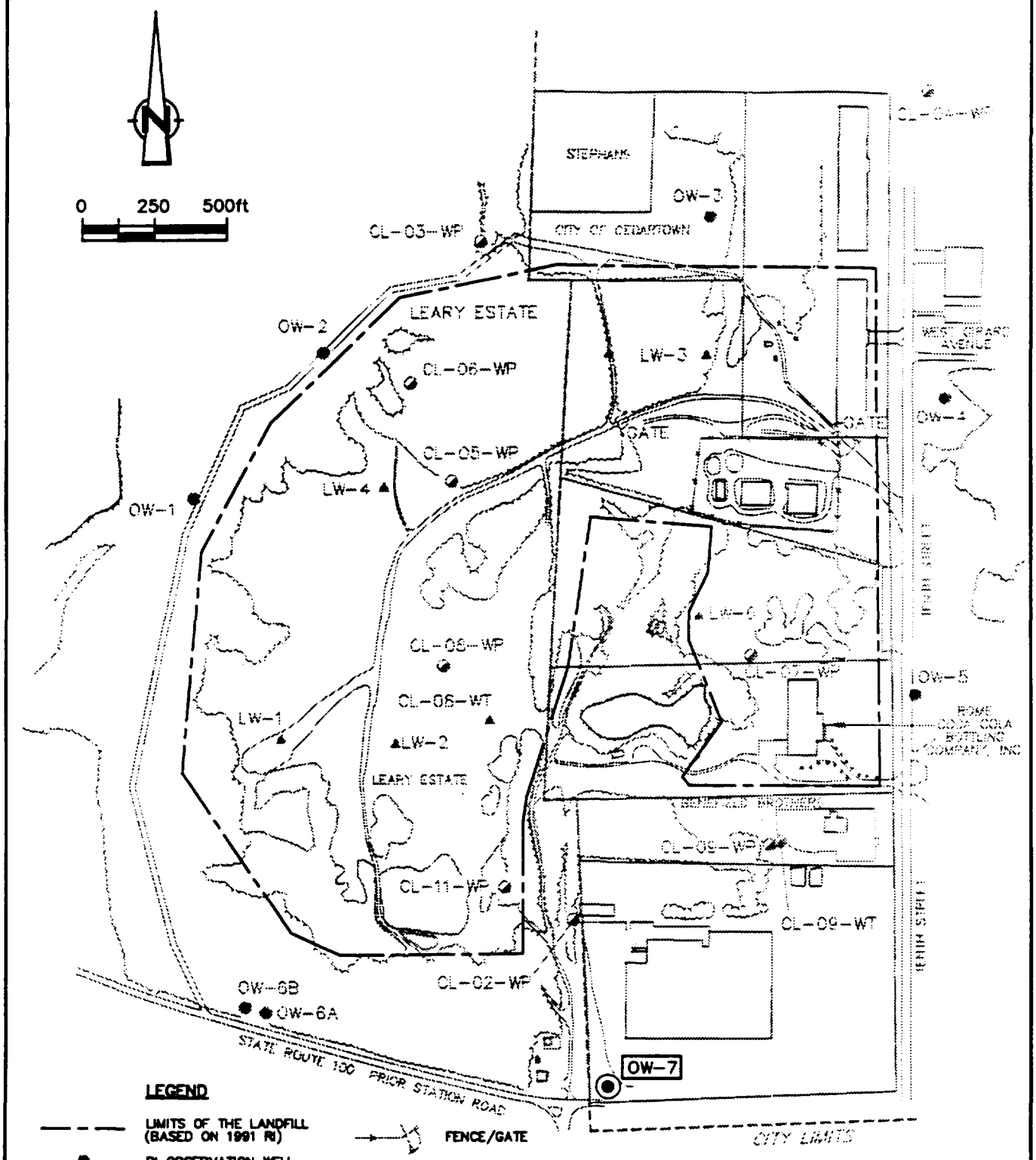


figure 3.2

LOCATION OF PROPOSED UPGRADIENT MONITORING WELL CEDARTOWN MUNICIPAL LANDFILL SITE

Cedartown, Georgia

CRA

3482 (9) JULY 05/94(W) REV.0 (P-28)

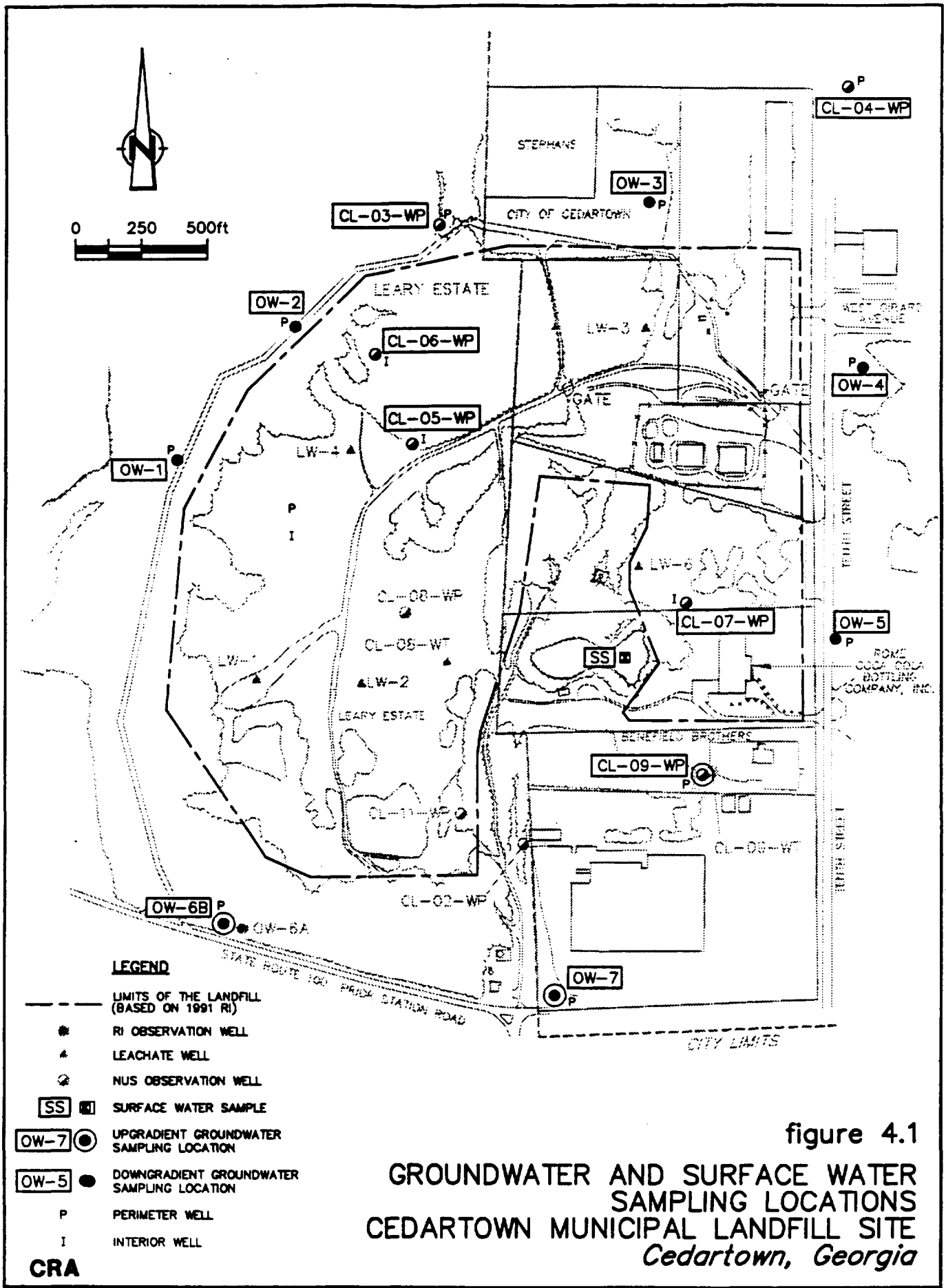
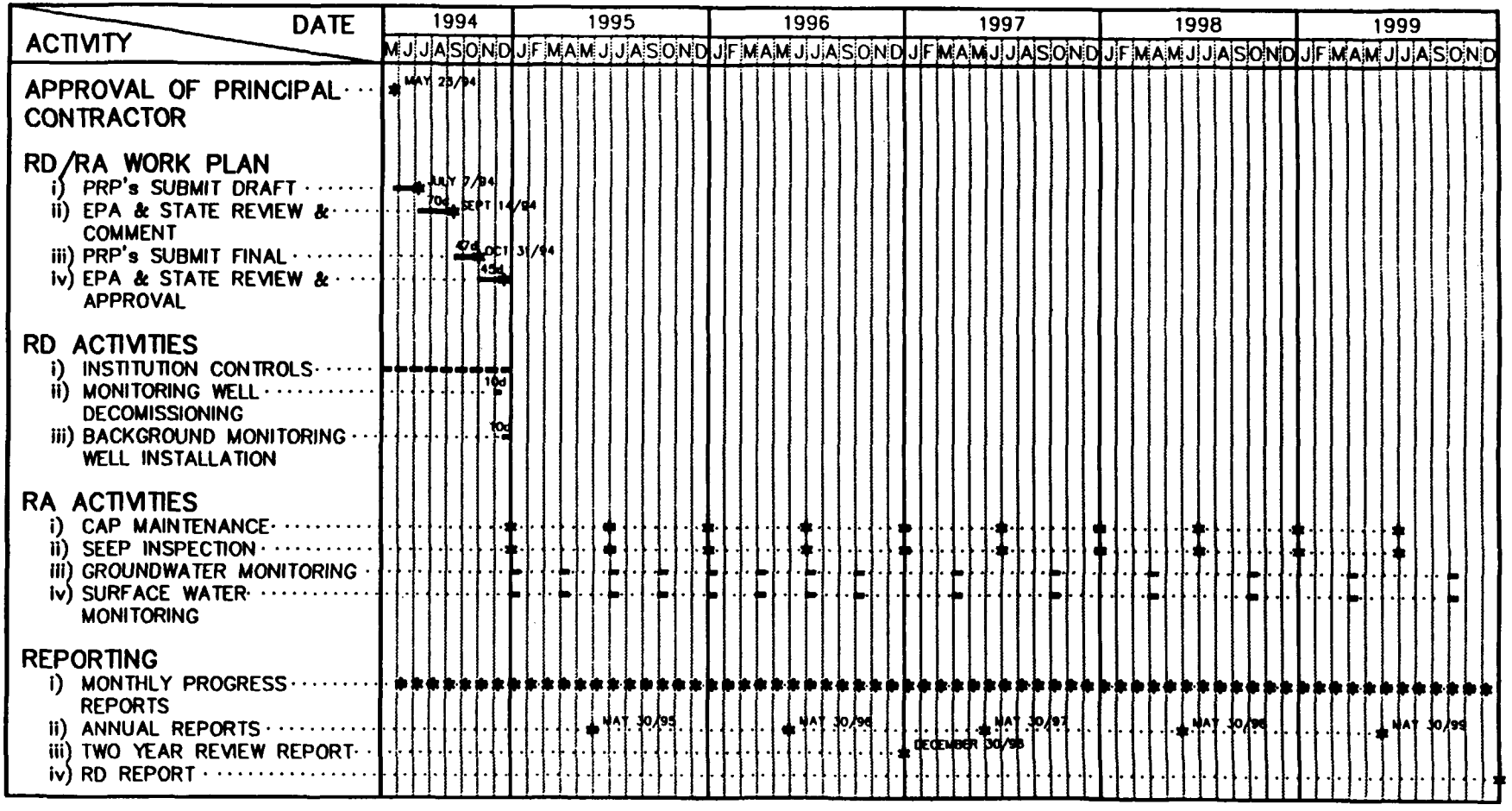


figure 4.1

GROUNDWATER AND SURFACE WATER SAMPLING LOCATIONS
CEDARTOWN MUNICIPAL LANDFILL SITE
Cedartown, Georgia

3482 (9) OCT 27/94(W) REV.2 (P-29)



LEGEND

* MILESTONE EVENT

——— CONTINUOUS ACTIVITY

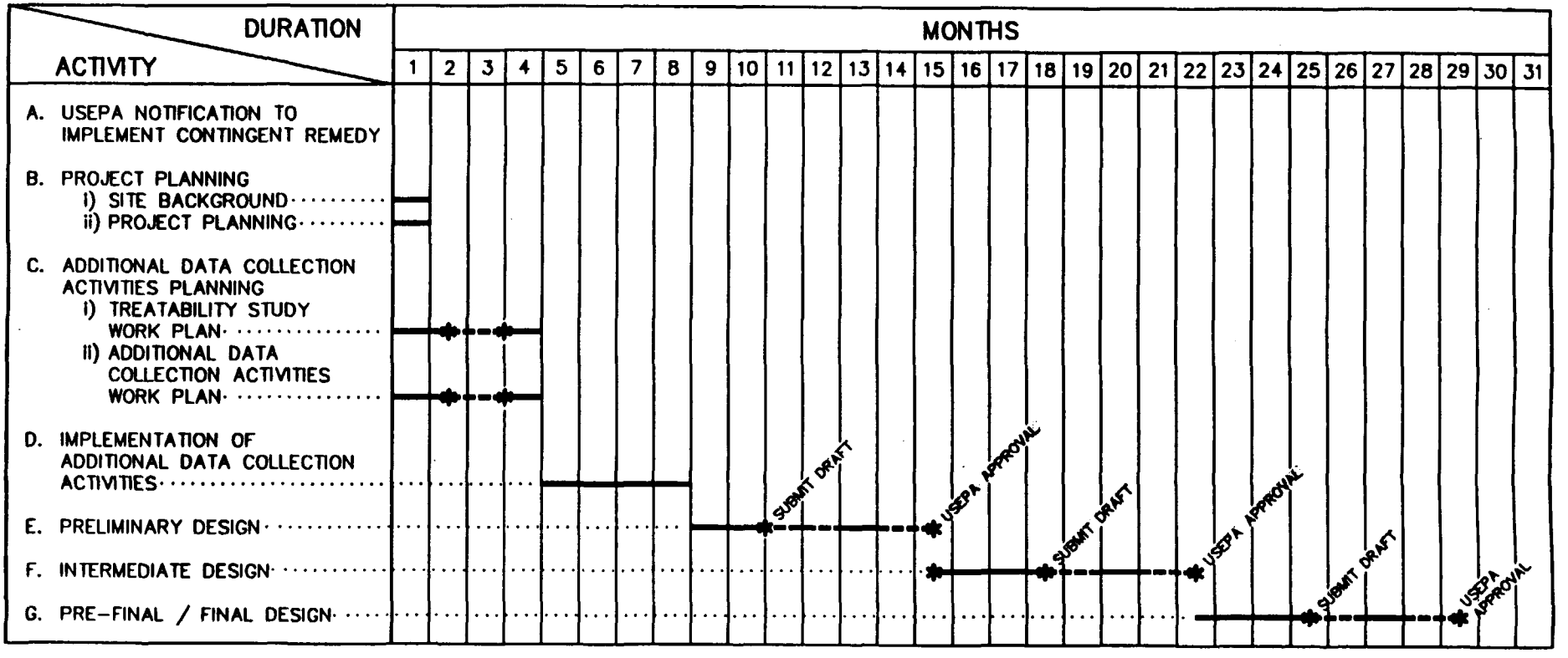
- - - - - - EPA/STATE REVIEW

figure 9.1

SCHEDULE OF ACTIVITIES
SELECTED REMEDY
CEDARTOWN MUNICIPAL LANDFILL SITE
Cedartown, Georgia

CRA

3482 (9) OCT 28/94(W) REV.1 (S-01)



LEGEND

- ✱ MILESTONE EVENT
- ——— CONTINUOUS ACTIVITY
- - - - - - EPA/STATE REVIEW

figure 9.2

SCHEDULE OF ACTIVITIES
CONTINGENCY REMEDY
CEDARTOWN MUNICIPAL LANDFILL SITE
Cedartown, Georgia

CRA

3482 (9) JUNE 14/94(W) REV.0 (S-02)

TABLES

TABLE 2.1

SUMMARY OF DETECTED COMPOUNDS IN
WASTE/SOIL SAMPLES
CEDARTOWN MUNICIPAL LANDFILL SITE
CEDARTOWN, GEORGIA

Compound	*Frequency of Detection*	*Range of Detections (3)* *Minimum*	*Maximum*	*Average (3) Concentration*	*Background (4) Soil Concentration*
VOCs (µg/kg)					
Acetone	9 / 10	ND(19)	120J	56	111
Benzene	1 / 10	ND(6)	4J	3.5 J	3.3 J
Carbon Disulfide	1 / 10	ND(6)	4J	3.5 J	ND (6)
Chlorobenzene	1 / 10	ND(6)	12J	4.3 J	ND (6)
1,2-Dichloroethane	2 / 10	ND(6)	180,000	18,010	ND (6)
Ethylbenzene	2 / 10	ND(6)	15J	4.7 J	ND (6)
Methylene Chloride	2 / 10	ND(6)	17	5.5 J	ND (6)
Toluene	2 / 10	ND(6)	11	4.1 J	ND (6)
Xylenes (Total)	4 / 10	ND(6)	50J	11.9	ND (6)
BNAs (µg/kg)					
bis(2-Ethylhexyl)phthalate	3 / 9	ND(410)	27,000	3,315	218 J
Di-n-butyl phthalate	2 / 9	ND(410)	1,300	483	300 J
2-Methylnaphthalene	1 / 9	ND(410)	120,000	13,554	268 J
Naphthalene	3 / 9	ND(410)	95,000	10,740	218 J
Phenol	1 / 9	ND(410)	75,000	8,554	ND (500)
Inorganics (mg/kg)					
Aluminum	9 / 9	1,700	14,000	6,867	14,000
Arsenic	9 / 9	6.6	23	10.1	17.7
Barium	9 / 9	18	680	207	113
Beryllium	7 / 9	ND(0.31)	9.4	3.1	2.6
Cadmium	5 / 9	ND(0.6)	21	3.9	0.6
Calcium	7 / 9	ND(310)	120,000	14,244	2,484
Chromium	9 / 9	8.5	300	48	31.6
Cobalt	7 / 9	ND(3.1)	140	49	40
Copper	9 / 9	12	120	54	42
Iron	9 / 9	12,000	180,000	59,778	69,720
Lead	9 / 9	8	2,100	258	49
Magnesium	6 / 9	ND(310)	970	500	593
Manganese	9 / 9	4.2	2,900	1,202	1,502
Mercury	5 / 9	ND(0.1)	0.2	0.15 J	0.17
Nickel	7 / 9	ND(25)	350	122	81
Potassium	9 / 9	370	1,900	1,054	630
Selenium	4 / 9	ND(0.7)	8.4	1.8	ND (0.6)
Sodium	3 / 9	ND(310)	3,000	560	ND (320)
Vanadium	8 / 9	ND(3.5)	37	18.3	444
Zinc	9 / 9	3.3	1,300	345	237
Cyanide	1 / 9	ND(0.3)	0.56	0.20 J	0.29 J

Notes:

(1) ND(5) - Not detected at detection limit presented in brakets.
(2) J - Indicates value is estimated.
(3) Samples from Site-Specific Background locations were not included.
(4) Background soil sample locations include OW-4, OW-5 and OW-6.

TABLE 2.2

SUMMARY OF DETECTED COMPOUNDS IN
LEACHATE SAMPLES
CEDARTOWN MUNICIPAL LANDFILL SITE
CEDARTOWN, GEORGIA

Compound	*Frequency of Detection*	*Range of Detections*		*Average Concentration*
		Minimum	*Maximum*	
VOCs (µg/L)				
Acetone	5 / 7	ND(10)	55	25
Benzene	5 / 7	ND(5)	37J	17.6
Chlorobenzene	3 / 7	ND(5)	14	9.6
Ethylbenzene	3 / 7	ND(6)	290	67
Toluene	2 / 7	ND(6)	47	10.3
Xylenes (Total)	5 / 7	ND(5)	1,600	372
BNAs (µg/L)				
Acenaphthene	1 / 7	ND(10)	6J	8.1 J
Benzoic Acid	1 / 7	ND(10)	31J	26 J
bis(2-Ethylhexyl)phthalate	3 / 7	ND(10)	15	8.6 J
Dibenzofuran	1 / 7	ND(10)	3J	7.7 J
2,4-Dimethylphenol	3 / 7	ND(10)	16	10.1 J
Di-n-butyl phthalate	1 / 7	ND(10)	3J	7.7 J
1,4-Dichlorobenzene	1 / 7	ND(10)	4J	7.9 J
Fluorene	2 / 7	ND(10)	4J	7.6 J
2-Methylnapthalene	2 / 7	ND(10)	36	13.3
4-Methylphenol	1 / 7	ND(10)	27	11.1
Naphthalene	4 / 7	ND(10)	125	36
N-nitrosodimethylamine	1 / 7	ND(10)	5J	8.0 J
Phenanthrene	1 / 7	ND(10)	5J	8.0 J
Phenol	2 / 7	ND(10)	3J	7.4 J

Notes:

(1) ND(5) - Not detected at detection limit presented in brakets.
(2) J - Indicates value is estimated.

TABLE 2.2

SUMMARY OF DETECTED COMPOUNDS IN
LEACHATE SAMPLES
CEDARTOWN MUNICIPAL LANDFILL SITE
CEDARTOWN, GEORGIA

Compound	*Frequency of Detection*	*Range of Detections*		*Average Concentration*
		Minimum	*Maximum*	
Inorganics (µg/L)				
Aluminum	7 / 7	1,300	390,000	112,386
Arsenic	4 / 7	ND(5)	19	8.7
Barium	7 / 7	82	12,000	3,312
Beryllium	3 / 7	ND(5)	220	37
Cadmium	3 / 7	ND(5)	55	16.1
Calcium	7 / 7	8,200	170,000	108,886
Chromium	7 / 7	15	700	212
Cobalt	4 / 7	ND(50)	5,100	846
Copper	7 / 7	12	1,800	545
Iron	7 / 7	4,900	2,400,000	554,700
Lead	6 / 7	ND(5)	1,700	509
Magnesium	6 / 7	ND(5,000)	60,000	38,929
Manganese	7 / 7	1,200	180,000	29,000
Mercury	4 / 7	ND(0.2)	6.7	1.5 J
Nickel	6 / 7	ND(40)	8,300	1,451
Potassium	6 / 7	ND(5,000)	100,000	59,500
Sodium	7 / 7	3,200	280,000	168,743
Vanadium	5 / 7	ND(50)	670	240
Zinc	7 / 7	12	17,000	3,026
Cyanide	5 / 7	ND(5)	80	17.9
General Chemistry (µg/L)				
Alkalinity	7 / 7	40,000	1,100,000	734,285
Chloride	7 / 7	19,000	330,000	179,714
Hardness	7 / 7	26,000	820,000	438,000
Sulfate	7 / 7	8,000	46,000	16,429

Notes:

(1) ND(5) - Not detected at detection limit presented in brakets.
(2) J - Indicates value is estimated.

TABLE 2.3

SUMMARY OF DETECTED COMPOUNDS IN SOIL SAMPLES CEDARTOWN MUNICIPAL LANDFILL SITE CEDARTOWN, GEORGIA

Compound	*Frequency of Detection*	*Range of Detections (3)* Minimum	Maximum	*Average (3) Concentration*	*Background (4) Soil Concentration*
VOCs µg/kg)					
Acetone	3 / 10	ND(12)	210J	42	111
Benzene	1 / 10	ND(6)	8J	4.4 J	3.3 J
2-Butanone	1 / 10	ND(11)	36J	10.9 J	ND (12)
Carbon Disulfide	1 / 10	ND(6)	8J	4.5 J	ND (6)
Chlorobenzene	1 / 10	ND(6)	4J	4.0 J	ND (6)
Ethylbenzene	1 / 10	ND(6)	190J	23	ND (6)
Methylene Chloride	1 / 10	ND(6)	21J	5.9 J	ND (6)
Toluene	1 / 10	ND(6)	5J	4.2 J	ND (6)
Xylenes (Total)	1 / 10	ND(6)	900J	94	ND (6)
BNAs (µg/kg)					
bis(2-Ethylhexyl)phthalate	1 / 9	ND(410)	230J	275 J	218 J
2-Methylnaphthalene	1 / 9	ND(410)	88J	254 J	208 J
Naphthalene	1 / 9	ND(410)	210J	267 J	218 J
Inorganics (mg/kg)					
Aluminum	9 / 9	4,700	18,000	12,767	14,000
Arsenic	9 / 9	4.6	27	12.9	17.7
Barium	9 / 9	49	1,100	283	113
Beryllium	9 / 9	0.7	6.7	3.7	2.6
Cadmium	5 / 9	ND(0.6)	2.4	1.2	0.6
Calcium	6 / 9	ND(290)	6,700	1,371	2,484
Chromium	9 / 9	19	46	32	31.6
Cobalt	8 / 9	ND(2.9)	470	111	40
Copper	9 / 9	13	86	54	42
Iron	9 / 9	21,000	160,000	101,556	69,720
Lead	9 / 9	6.4	100	31	49
Magnesium	6 / 9	ND(290)	1,200	469	593
Manganese	9 / 9	33	33,000	5,575	1,502
Mercury	3 / 9	ND(0.12)	0.4J	0.16	0.17
Nickel	9 / 9	11	340	158	81
Potassium	9 / 9	370	4,000	1,188	630
Selenium	1 / 9	ND(0.6)	3.1	0.7 J	ND (0.6)
Sodium	1 / 9	ND(290)	16,000	1,928	ND (320)
Vanadium	9 / 9	16	59	42	444
Zinc	9 / 9	38	650	381	237

Notes:

(1) ND(5) - Not detected at detection limit presented in brakets.
(2) J - Indicates value is estimated.
(3) Samples from Site-Specific Background locations were not included.
(4) Background soil locations include OW-4, OW-5 and OW-6.

TABLE 2.4

SUMMARY OF DETECTED COMPOUNDS IN
GROUNDWATER SAMPLES
CEDARTOWN MUNICIPAL LANDFILL SITE
CEDARTOWN, GEORGIA

		Downgradient Wells (3)			*Background Wells (4)*		
	Frequency of	*Range of Detections*		*Average*	*Range of Concentrations*		*Average*
Compound	*Detection*	*Minimum*	*Maximum*	*Concentration*	*Minimum*	*Maximum*	*Concentration*
VOCs (µg/L)							
Acetone	3 / 14	ND(10)	240	25	ND(10)	570	149
1,2-Dichloroethane	1 / 14	ND(5)	4J	2.6 J	-		ND (5)
Xylenes (Total)	1 / 14	ND(5)	2J	2.5 J	-		ND (5)
Inorganics (µg/L)							
Aluminum	14 / 14	525	77,000	21,107	930	40,000	18,108
Arsenic	5 / 14	ND(5)	18	7.1	-		ND (5)
Barium	14 / 14	55	830	361	10	475	217
Beryllium	6 / 14	ND(5)	60	11.9	ND(5)	50	17
Cadmium	4 / 14	ND(5)	24	4.8 J	ND(5)	8.5	4 J
Calcium	14 / 14	51,000	865,000	272,429	11,000	61,000	40,250
Chromium	9 / 20	ND(10)	230	43	ND(10)	185	48
Cobalt	7 / 14	ND(50)	250	68	ND(50)	335	136
Copper	13 / 14	ND(10)	180	58	ND(10)	370	138
Iron	14 / 14	3,600	200,000	52,679	8,100	125,000	50,250
Lead	8 / 14	ND(3)	100	20	ND(5)	308	83
Magnesium	12 / 14	ND(5,000)	280,000	61,421	ND(5,000)	24,500	11,125
Manganese	19 / 20	ND(15)	8,800	1,714	96	5,000	1,487
Mercury	3 / 14	ND(0.2)	0.4	0.15 J	ND(0.2)	1.1	0.6
Nickel	12 / 14	ND(40)	1,000	204	ND(40)	1,170	405
Potassium	11 / 14	ND(5,000)	88,000	25,350	ND(5,000)	15,000	8,250
Sodium	11 / 14	ND(5,000)	290,000	48,079	ND(5,000)	10,000	5,783
Vanadium	5 / 14	ND(50)	170	57	ND(50)	120	56
Zinc	12 / 14	ND(20)	3,200	520	31	2,550	937
General Chemistry (µg/L)							
Alkalinity	14 / 14	86,000	1,200,000	430,071	72,000	155,000	114,250
Chloride	13 / 14	ND(2,000)	15,000	7,286	3,000	3,000	3,000
Hardness	14 / 14	140,000	2,200,200	917,857	20,000	156,000	109,000
Sulfate	9 / 14	ND(5,000)	940,000	109,464	ND(5,000)	15,000	10,188

Notes:

(1) ND(5) - Not detected at detection limit presented in brakets.
(2) J - Indicates value is estimated.
(3) Samples from Site-Specific Background locations were not included.
(4) Background well locations include CL-09-WP and OW-6B.

TABLE 2.5

SUMMARY OF DETECTED COMPOUNDS IN
SURFACE WATER SAMPLES
CEDARTOWN MUNICIPAL LANDFILL SITE
CEDARTOWN, GEORGIA

Compound	*Frequency of Detection*	*Range of Detections (3)*		*Average (3) Concentration*	*Background (4) Surface Water Concentration*
		Minimum	*Maximum*		
VOCs					
Acetone	2 / 3	ND(10)	100	54	ND (10)
2-Butanone	1 / 3	ND(10)	6J	5.3 J	ND (10)
BNAs					
Acenaphthene	1 / 3	ND(10)	11	7.0 J	ND (10)
Anthracene	1 / 3	ND(10)	4J	4.7 J	ND (10)
Benzo(a)anthracene	1 / 3	ND(10)	3J	4.3 J	ND (10)
Dibenzofuran	1 / 3	ND(10)	9J	6.3 J	ND (10)
Di-n-butyl phthalate	1 / 3	ND(10)	6J	5.3 J	ND (10)
Fluorene	1 / 3	ND(10)	15	8.3 J	ND (10)
2-Methylnapthalene	1 / 3	ND(10)	190	67	ND (10)
Naphthalene	1 / 3	ND(10)	47	19	ND (10)
Phenanthrene	1 / 3	ND(10)	42	17.3	ND (10)
Pyrene	1 / 3	ND(10)	6J	5.3 J	ND (10)
Inorganics					
Aluminum	2 / 3	ND(200)	19,000	6,467	ND (200)
Arsenic	1 / 3	ND(5)	9	4.7 J	ND (5)
Barium	2 / 3	ND(200)	1,200	438	ND (200)
Calcium	3 / 3	5,400	140,000	55,800	26,000
Chromium	1 / 3	ND(10)	62	26	ND (10)
Cobalt	1 / 3	ND(50)	50	33	ND (50)
Copper	1 / 3	ND(10)	49	22	ND (25)
Iron	3 / 3	510	190,000	63,743	160
Lead	1 / 3	ND(5)	20	8.3	ND (5)
Magnesium	2 / 3	ND(5,000)	55,000	22,833	13,000
Manganese	3 / 3	82	4,900	1,701	19
Nickel	1 / 3	ND(40)	55	32	ND (40)
Sodium	1 / 3	ND(5,000)	290,000	98,333	ND (5000)
Vanadium	1 / 3	ND(50)	110	53	ND (50)
Zinc	2 / 3	ND(50)	540	199	33

Notes:

(1) ND(5) - Not detected at detection limit presented in brakets.
(2) J - Indicates value is estimated.
(3) Samples from Site-Specific Background locations were not included.
(4) Background concentrations are from sample location SS-8.

TABLE 2.6

SUMMARY OF DETECTED COMPOUNDS IN
SEDIMENT SAMPLES
CEDARTOWN MUNICIPAL LANDFILL SITE
CEDARTOWN, GEORGIA

Compound	*Frequency of Detection*	*Range of Detections (3)* Minimum	Maximum	*Average (3) Concentration*	*Background (4) Sediment Concentration*
VOCs (ug/kg)					
Acetone	2 / 4	ND(13)	1,500J	467	70
Benzene	1 / 4	ND(7)	6J	7.5 J	3.4 J
2-Butanone	2 / 4	ND(13)	650J	184	ND(12)
Ethylbenzene	1 / 4	ND(7)	4.2J	7.1 J	ND(6)
Methylene Chloride	1 / 4	ND(7)	23	11.8	6.3 J
Toluene	1 / 4	ND(7)	8.5	8.1	ND(6)
BNAs (ug/kg)					
bis(2-Ethylhexyl)phthalate	1 / 4	ND(440)	220J	244 J	373 J
Diethylphthalate	1 / 4	ND(520)	960	512 J	ND(500)
Inorganics (mg/kg)					
Aluminum	4 / 4	7,700	17,000	12,300	10,933
Arsenic	4 / 4	5	13	8.2	11.5
Barium	4 / 4	67	170	116	85
Beryllium	4 / 4	0.62	2.8	1.3	1.3
Cadmium	1 / 4	ND(0.8)	0.7	0.6 J	0.4 J
Calcium	4 / 4	880	12,550	5,808	1,397
Chromium	4 / 4	16	28	21	22
Cobalt	4 / 4	6.2	28	14.4	21
Copper	4 / 4	7	29	19.6	20
Iron	4 / 4	16,000	48,000	30,250	37,573
Lead	4 / 4	13.9	47	35	47
Magnesium	3 / 4	ND(830)	1,040	711	493
Manganese	4 / 4	330	1,300	721	804
Mercury	1 / 4	ND(0.17)	0.2	0.14 J	0.10 J
Nickel	4 / 4	8.4	89	36	35
Potassium	2 / 4	ND(390)	2,050	910	323
Sodium	1 / 4	ND(330)	715	373	ND(320)
Vanadium	4 / 4	25	39	30	31
Zinc	4 / 4	55	400	197	117

Notes:

(1) ND(5) - Not detected at detection limit presented in brakets.
(2) J - Indicates value is estimated.
(3) Samples from Site-Specific Background locations were not included.
(4) Background sediment locations include OW-4, OW-5, OW-6 and SS-8.

TABLE 2.7

GROUNDWATER CONTAMINANTS OF CONCERN AND PERFORMANCE STANDARDS
CEDARTOWN MUNICIPAL LANDFILL SITE
CEDARTOWN, GEORGIA

Contaminant of Concern	*Downgradient Concentration Detected (µg/L)*		*Measured Background (µg/L)*	*Performance Standard (µg/L)*
	Mean	*Maximum*		
Manganese	1,714	8,800	1,487	175[a]
Beryllium	11.9	60	17	4[b]
Cadmium[c]	4.8	24	4	5[b]
Chromium[d]	43	230	48	100[b]
Lead	20	100	83	15[e]

a Calculated value based on an acceptable risk or a Hazard Quotient (HQ) of 1. Exposure assumptions are a 2 liter per day ingestion rate and a 70 kilogram body weight.

b Safety Drinking Water Act Maximum Contaminant Level (MCL).

c Included due to contaminant concentrations and frequency of detection.

d While chromium was below detection during third sampling round, it was detected above standards in previous rounds. Therefore, it was retained for determining performance standards.

e EPA Action Level from Lead and Copper Rule, 56 FR, June 7, 1991.

TABLE 2.8

SURFACE WATER CONTAMINANTS OF CONCERN
AND PROPOSED PERFORMANCE STANDARDS
CEDARTOWN MUNICIPAL LANDFILL
CEDARTOWN, GEORGIA

Contaminant of Concern	*FAWQC (1, 2)*		*GSWQS (3)*
	Acute (µg/L)	*Chronic (µg/L)*	*(µg/L)*
Aluminum	750 (4)	87 (4)	NA
Chromium	984	117	120 a
Copper	9	6.5	6.5 a
Lead	82	3.2	1.3 a
Nickel	1,400	160	88 a
Zinc	120	110	60 a

Notes:

FAWQC	-	Federal Ambient Water Quality Criteria.
GSWQS	-	Georgia State Water Quality Standards.
NA	-	Not Available.
ND	-	Not Detected.
a	-	Assumed Surface Water Hardness ≤100 (as mg/L $CaCO_3$).

References:

(1)	-	USEPA Quality Criteria for Water 1986 EPA/440/5-86-001 May 1986, 51 Federal Register 43665, Update September 1987.
(2)	-	IRIS - EPA Integrated Risk Information System Database, July 1992.
(3)	-	Rules and Regulations for Water Quality Control, Chapter 391-3-6, 1993, Georgia Department of Natural Resources, Atlanta, Georgia.
(4)	-	EPA Region IV "Toxic Substance Spreadsheet", EPA Water Quality Standards Unit.

TABLE 3.1

CONSTRUCTION DETAILS FOR NUS MONITORING WELLS SCHEDULED FOR DECOMMISSIONING(1)
CEDARTOWN MUNICIPAL LANDFILL SITE
CEDARTOWN, GEORGIA

Well No.	Ground Elevation (ft. AMSL)(2)	Depth to Bedrock (ft. BGS)	Top of Well Elevation (ft. AMSL)	Screened Interval(3)		Bottom of Well		Screen Interval Lithologic Material
				Elevation (ft AMSL)	Depth (ft BGS) (4)	Elevation (ft AMSL)	Depth (ft BGS)	
CL-02-WP	819.7	43.5	822.04	768.2 - 778.2	41.5 - 51.5	767.7	52.0	clay/limestone
CL-08-WP	854.5	--	856.21	751.0 - 761.0	93.5 - 103.5	750.5	104.0	siderite
CL-09-WT	802.5	--	803.18	781.5 - 786.5	16.0 - 21.0	781.0	21.5	clay
CL-11-WP	NA(5)	NA	NA	--	51.5 - 61.5	--	62.0	unknown

Notes:

(1) Source: NUS Corporation data.
(2) AMSL - Above mean sea level
(3) Depths are estimated
(4) BGS - Below Ground Surface
(5) NA - not available

TABLE 4.1

CONSTRUCTION DETAILS FOR PERIMETER BEDROCK MONITORING WELLS
CEDARTOWN MUNICIPAL LANDFILL SITE
CEDARTOWN, GEORGIA

Well Number	*Ground Elevation (ft. AMSL)(1)*	*Depth to Bedrock (ft. BGS)*	*Top of Well Elevation (ft. AMSL)*	*Screened Interval*		*Bottom of Well*		*Screened Interval Lithologic Material*
				Elevation (ft. AMSL)	*Depth (ft. BGS)(2)*	*Elevation (ft. AMSL)*	*Depth (ft. BGS)*	
OW-1	820.79	51.5	823.80	761.79-771.79	49.0-59.0	760.79	60.0	dolostone
OW-2	824.45	39.0	827.50	767.45-782.45	42.0-57.0	764.45	60.0	dolostone
OW-3	801.50	156.0	803.29	Open Hole		608.50 (3)	193.0	limestone
OW-4	799.00	42.5	801.52	739.0-749.0	50.0-60.0	730.0	69.0	limestone
OW-5	795.42	21.5	797.92	712.42-732.42	63.0-83.0	710.42	85.0	limestone
OW-6A	804.06	28.0	805.06	Open Hole		757.06	47.0	limestone
OW-6B	804.12	37.2	805.12	Open Hole		696.12	108.0 (4)	limestone
CL-03-WP	833.60	--	836.41	736.10-751.10	82.5-97.5	735.6	98.0	clay/limestone
CL-04-WP	796.81	--	796.81	755.31-765.31	31.5-41.5	754.81	42.0	limestone
CL-09-WP	802.40	--	803.65	770.90-780.90	21.5-31.5	770.4	32.0	limestone

Notes:

(1) AMSL - Above Mean Sea Level.
(2) BGS - Below Ground Surface.
(3) Sounding device may not have been heavy enough to penetrate sediment accumulation.
(4) Well has since collapsed to 753.42 ft. AMSL or 51.80 ft. BGS.

APPENDIX A

REMEDIAL DESIGN/REMEDIAL ACTION PLAN
SAMPLING AND ANALYSIS PLAN

CEDARTOWN MUNICIPAL LANDFILL SITE
CEDARTOWN, GEORGIA

PREFACE

The Cedartown Landfill Site Group (Group) proposes to conduct a Remedial Design/Remedial Action (RD/RA) at the former Cedartown Municipal Landfill Site (Site), located in Cedartown, Georgia. The RD/RA will be conducted in accordance with the terms and conditions of the Unilateral Administrative Order (UAO), entered into by the Group and the United States Environmental Protection Agency (USEPA).

The primary objective of the RD/RA Work Plan is to provide a comprehensive description of the additional field data collection and evaluation activities to be performed for the selected Site remedy. A comprehensive design management schedule for completion of each major activity and submission of each deliverable is also included. The Work Plan was developed in direct response to the requirements of the UAO and identifies the activities to be performed to satisfy the RD/RA objective summarized above. The following Sampling and Analysis Program (SAP) has been perpared as part of the RD/RA Work Plan for the Cedartown Municipal Landfill Site.

The purpose of the SAP is to describe the procedures and protocols to be followed during the implementation of the RD/RA activities in order to ensure that the results of the investigation are representative of the Site conditions.

The Sampling and Analysis Plan (SAP) presented herein consists of the following submittals:

Submittal A1 - Field Sampling Plan (FSP): The FSP presents the procedures and protocols for implementing the tasks that will be completed during the field investigations phase of the RD/RA.

Submittal A2 - Quality Assurance Project Plan (QAPP): The QAPP defines the data quality objectives applicable to the RD/RA and identifies analytical protocols, quality assurance/quality control procedures and sample handling and chain of custody procedures applicable to all sample collection and analysis activities.

Any revisions or amendments to these submittals shall be made in accordance with the terms and conditions of the UAO.

The following FSP and QAPP will be used in the RD/RA activities, the Operation and Maintenance activities and the Performance Standards Verification activities.

SUBMITTAL A1

FIELD SAMPLING PLAN
FORMING PART OF
SAMPLING AND ANALYSIS PLAN
REMEDIAL DESIGN/REMEDIAL ACTION PLAN

CEDARTOWN MUNICIPAL LANDFILL SITE
CEDARTOWN, GEORGIA

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A1.1 INTRODUCTION

The Field Sampling Program (FSP) presents the procedures and protocols required for implementing the field investigation tasks associated with the Remedial Design/Remedial Action (RD/RA) to be performed at the Cedartown Municipal Landfill Site (Site) located in Cedartown, Georgia. Implementation of the FSP will ensure that sufficient data, both qualitatively and quantitatively, will be available at the completion of the RD/RA to perform a public health and environmental risk assessment and to effectively evaluate the need for contingent groundwater treatment remedial action for the Site. The analytical protocols to be used for the analysis of samples collected under the FSP are presented in the Quality Assurance Project Plan (QAPP) Provided in Submittal A2 of Appendix A.

The procedures and protocols presented herein were developed in accordance with guidance from the February 1991 United States Environmental Protection Agency (USEPA) Region IV Standard Operating Procedures and Quality Assurance Manual (SOP). The SOP shall be used as the reference document in the event of omissions from the RD/RA Work Plan or the FSP.

A1.2 PROJECT DESCRIPTION

The RD/RA Work Plan describes the tasks necessary to implement the remedial action specified in the Record of Decision (ROD) issued on November 2, 1993. The FSP was developed based upon the existing database, data deficiencies and RD/RA Tasks as identified in the RD/RA Work Plan. The field investigation tasks/activities which are addressed by the FSP include:

i) monitoring well installation;
ii) groundwater monitoring and sample collection;
iii) surface water sample collection; and
iv) monitoring well decommissioning.

A1.2.1 BACKGROUND

A comprehensive description of the Site Background including regional setting, environmental setting and Site history is presented in the RD/RA Work Plan. In addition, the RD/RA Work Plan summarizes available information related to existing Site conditions including on and off-Site soils and the hydrogeologic setting beneath the Site.

A1.3 SITE INVESTIGATION PLAN AND FIELD PROTOCOLS

A1.3.1 GENERAL

The FSP has been developed to provide a sufficiently complete evaluation of;

i) the risk posed to public health and welfare and the environment from hazardous substances attributable to the Site;
ii) the background concentrations of the contaminants of concern in the groundwater upgradient of the Site; and
iii) the effectiveness of natural attenuation processes in preventing contaminant migration in the groundwater downgradient of the Site.

The following Tasks/Activities will be conducted during the FSP as specified in the RD/RA Work Plan.

i) installation of bedrock monitoring well(s) upgradient of the Site;
ii) groundwater monitoring and sampling from the perimeter monitoring wells (upgradient and downgradient);
iii) surface water sampling from the Coke Pond; and
iv) decommissioning of selected monitoring wells.

The following subsections detail the field activities associated with each of the above tasks. Details of the chain-of-custody procedures that will be implemented in the field and a summary of the sampling program are presented in Section A1.5 and Section A1.4, respectively.

The USEPA and affected property owners will be notified not less than 72 hours in advance of commencing field activities.

A1.3.2 INSTALLATION OF UPGRADIENT MONITORING WELL

A1.3.2.1 Purpose/Scope

A bedrock monitoring well will be installed upgradient of the groundwater flow direction in the location shown on Figure A1.1. The purpose of this well is to provide supplemental information regarding the background concentrations of the contaminants of concern in the groundwater passing beneath the Site.

A1.3.2.2 Drilling Procedures

The protocols to be used to install the borehole for the proposed monitoring well are described in the following subsections.

1. Permits and Access Agreements

   The State of Georgia requires that monitoring wells be permitted. Permit applications will be made and permits obtained before the proposed monitoring well is installed. These permits will be obtained in advance of well installation to minimize interference with the well installation schedule.

   The owner(s) of property on which the wells are to be located will be contacted in advance of the well installation program. A site access agreement will be obtained prior to commencing work. In the event that a site access agreement cannot be obtained by the Group within a reasonable period of time, the USEPA will be notified and requested to obtain access.

2. Overburden Drilling

   Overburden drilling will be required to install the well in this field program.

The overburden portion will be advanced using 4 1/4-inch inside diameter (8-inch outside diameter) hollow stem augers. Soil samples will be collected at 5-foot intervals during augering to identify and classify soil materials.

All soil samples will be collected using the standard penetration test method (ASTM 1586-84) or a continuous sampling system should soil conditions allow its use.

All soil samples collected will be described and classified according to the Unified Soil Classification System (USCS) and then stored in glass jars for geologic record. All samples retained for geologic record will be stored by the City for a period of one year.

During soil sampling, HNU (or equivalent) readings of soil samples will be taken from the open split spoon and will be recorded, as an indication of the presence of volatile organic contamination as soon as possible after collection. HNU (or equivalent) readings are considered as survey values which provide relative concentrations of volatile organic concentrations present in soil. All soil cuttings will be spread on polyethylene sheeting near the borehole.

Upon auger refusal, the hollow-stem augers will be removed from the borehole. The borehole will be reamed to ten inches in diameter using a tricone bit and wet-rotary drilling methods. Wet rotary methods utilize water or drilling mud (commonly a bentonite slurry) as a drilling fluid to carry cuttings to the surface. The 10-inch diameter hole will be advanced two feet into competent bedrock.

Steel casing, six inches in diameter, complete with centralizers, will be installed in the borehole, two feet into competent bedrock, where it will be grouted into place as described below.

Grout will consist of a cement/bentonite slurry and will have a mixture ratio of 6.5 gallons of water per 94-pound bag of normal Portland cement producing a slurry weight of 15.6 lb/gal.

Approximately four pounds of bentonite per sack of cement will be added to the slurry. The amount of bentonite will not exceed 5 percent of the mixed slurry to avoid excessive shrinkage of the cement.

The grout will be pumped into the annular space through a tremie pipe/packer assembly located in the casing near the bottom of the boring. The discharge end of the grout rod will be fitted with a ball valve to reduce the infiltration of grout into the well casing. The pumping of grout will continue until undiluted grout returns through the annulus to the ground surface. The casing will then be pushed into the bedrock to further seal the annulus. The grout will be allowed to set for a minimum period of 24 hours before bedrock coring commences.

All fluids generated during drilling will be contained and analyzed to determine final disposition. All containment drums will be labeled as to the date, time and contents. An inventory of the drums will be maintained.

3. Bedrock Coring

The bedrock portion of each bedrock monitoring well will be completed by coring techniques. All coring will be performed in accordance with ASTM D2113-83, using clean, potable water as the circulation medium. A record of water used for drilling will be kept. This record will include the date, time, borehole, water source, additives, purpose and the amount not recovered from the borehole. The corehole will be advanced using an "N" size corebarrel (1.88-inch diameter core and 2.98-inch diameter hole).

The borehole will be cored continuously, in 10-foot intervals, for the entire depth. The corehole will extend a minimum of 15 feet below the bedrock surface and 15 feet into a water-bearing fracture zone.

Each core run will be laid in core boxes in accordance with the above noted ASTM standard and visually inspected in the field by a qualified

geologist. The geologist will complete a geologic log of the core with particular attention being noted of fractures, aperture size, orientation, spacing, filling, roughness and discontinuity type. Rock quality designation (RQD) tests will be conducted over the length of the core. The procedure for applying the RQD is presented in Attachment A1-I. During drilling the water loss and gains will be closely monitored to identify fracture zones. The geologist will also note any staining or secondary mineralization within the fractures.

Upon reaching the final depth, the drilling fluid will be circulated to remove rock cutting from the borehole walls which remain after the drilling and reaming operations.

All core boxes will be clearly labeled to indicate the following: job name, job number, hole number, run number, run interval and date. All core boxes will be covered in plastic and placed in the secure area once they are logged and secured.

A1.3.2.3 Monitoring Well Installation Procedures

The proposed well will be completed as a 2-inch diameter monitoring well in the following manner.

The geologic log of the core will be examined to locate fracture zones. Based on the observed distribution of fractures (based on water losses or gains), fracture staining, secondary mineralization and RQD, a preferred monitoring interval will be selected.

The hole will be cored as described in Section A1.3.2.2. If the bedrock proves to be competent no well screen will be installed and the well will be completed as an open borehole in the bedrock (i.e., no well screen or riser will be installed). If the bedrock does not appear to be competent, the corehole will be reamed using wet rotary drilling techniques to a nominal 6-inch diameter to the desired depth. A 2-inch diameter stainless steel screen of predetermined length (maximum 10 feet) attached to 2-inch diameter

Schedule 10, Type 304, stainless steel riser will be installed through the surface casing to its desired depth. No lubricants other than potable water will be used in the assembly of the well screen and pipe. An inert sandpack (20-40 mesh) will be placed in the annulus space to a height of approximately two feet above the screen and will be confirmed by measuring. A 2-foot thick bentonite pellet seal will be placed above the sandpack. A tremie pipe will be lowered into the borehole and pure bentonite grout (volclay or equivalent) will be introduced to the annular space between the riser pipe and borehole wall. Pumping of grout will continue until undiluted grout returns to the ground surface. After the grout has set overnight, the remaining portion of the unfilled portion of the borehole will be filled with cement/bentonite to within two feet of the ground surface.

Well installations which are not completed at the end of a work day will be temporarily secured by placing the drilling auger head over the hole or installing a temporary fence around the drilling site.

Upon completion of the monitoring well, the protective surface casing will be fitted with a permanent lockable cap. A lock will be placed on the well for securement. A weep hole will be drilled in the casing to facilitate drainage after development and purging. A concrete protection collar measuring three feet by two feet by one foot in depth will be placed around the protective casing. The collar will be sloped such that it promotes the drainage of surface waters away from the protective casing.

The monitoring well will be clearly labeled with its own unique identification number in an area where it is protected from possible vandalism. A label will be placed stating that the well is a monitoring well and should not be used for drinking or irrigation.

Completion details for a typical monitoring well are shown on Figure A1.2.

A1.3.2.4 Well Development - Bedrock Monitoring Well

The bedrock monitoring wells will be developed to a silt-free condition, if possible, following installation by bailing or pumping. Development activities will commence no sooner than 24 hours after completion of the monitoring wells. Well development will continue until water flows freely into the well and the water is silt free. Field measurements of pH, conductivity, temperature and turbidity will be taken of the evacuated water as well as the volume removed. Development water at the monitoring well location will be placed in 55-gallon drums. Upon completion of development at each location the drums will be transported to an interim storage area and the development water will be transferred to a temporary storage tank. When the sampling program is completed or when the tank is full, whichever occurs first, the contents of the tank will be sampled and analyzed in order to determine disposal requirements. The amount of water removed from each well during development will be recorded.

A1.3.2.5 Hydraulic Monitoring

Before any purging and sampling, the water level in each monitoring well will be measured using an electric sounding device. A permanent mark will be carved into the well casings so that the same point is used each time a water level is taken. This method involves lowering a probe into the well; when the probe contacts the water, an electric circuit is completed. The probe is connected to a two-conductor electric wire that is calibrated in 0.01-foot intervals, mounted on a reel containing batteries (1.5 volt) and has an audio alarm which emits a signal when the circuit is closed.

Water levels will be recorded in the field log book to the nearest 0.01 foot. Measuring devices will be decontaminated after each use as specified in Section A1.3.5. Prior to use in the field, the measuring device will be calibrated using a steel measuring tape.

A1.3.2.6 Groundwater Sampling

The purpose of the groundwater sampling is to provide data for evaluating the impact, if any, of the landfill on the downgradient groundwater quality. The groundwater sampling and analysis program will be conducted over a period of five (5) years, whereby, quarter-annual samples will be collected during the first two (2) years and semi-annual samples will be collected for the remaining three (3) years for the perimeter wells. The interior wells will be sampled quarterly for the first year and semi-annually for the second year. The frequency of sampling of the interior wells for the following three (3) years will be consistent with the frequency of sampling of the perimeter wells for this period. The locations of the groundwater monitoring wells scheduled for sampling are indicated on Figure A1.3. After the initial two (2) years of the program, a review of the data from the groundwater sampling program of the perimeter wells will be used to determine whether groundwater Performance Standards continue to be appropriate and to determine the effectiveness of natural attenuation of contaminants in the groundwater.

Low flow purging techniques will be used for well sampling.

Interior monitoring wells CL-06-WP and CL-07-WP have been noted to be periodically dry. Should these wells be dry during a sampling event, CL-06-WP and CL-07-WP will not be sampled.

The sampling procedures for the monitoring wells are described below. The procedures are used to maintain consistent and reproducible methods in obtaining and analyzing samples from the monitoring wells. The procedures used are based on:

- Procedures Manual for Ground-Water Monitoring at Solid Waste Disposal Facilities, EPA-530/SW-611, August 1977
- Test Methods for Evaluating Solid Waste, Physical/Chemical Methods, USEPA, SW-846, Revision 1, First Update, November 1990

- RCRA Draft Permit Writer's Manual: Ground-Water Protection, GeoTrans: USEPA Contract No. 68-01-6464
- Engineering Support Branch - Standard Operating Procedures and Quality Assurance Manual, USEPA Region IV, April 1986.

All proposed monitoring wells will be sampled according to the following protocols:

1. New disposable latex gloves will be used when sampling each well. Gloves will be changed prior to collection of each new sample.

2. The sampler will measure and record the depth to water in each well to the nearest 0.01 foot using an electric tape. The wetted portion of the electric tape will be decontaminated prior to use in each well as per Section A1.4.6.

3. Prior to sampling, each well will be slowly purged using a bladder or peristaltic pump to remove a minimum of three and a maximum of five times the standing water volume in the well, or until dry. The slow purging of the wells is necessary to minimize the amount of fines in the water samples collected. Field measurements of pH, conductivity, turbidity and temperature (per item 4) shall be used to determine whether to terminate purging upon removal of three times the standing water volume or continue to five times the volume. In the event that a well is purged dry prior to achieving three well volumes, groundwater will be permitted to recover to a level sufficient for sample collection. The time that the well was bailed dry will be noted and well recovery will be monitored. Prior to use in the initial and all subsequent monitoring wells, the selected purge pump will be precleaned as described in Section A1.4.5. All groundwater not collected for analyses will be contained, sampled and stored for disposal pending the receipt of analytical results.

4. Field measurements of pH and conductivity (e.g., using a DspH-3 pH/3 RGE Conductivity Meter or equivalent), turbidity (e.g., using Manual Hach Ratio Turbidimeter Model 18900-00 or equivalent) and

temperature (e.g., using a YSI Model 33 SCT meter, or equivalent) will be recorded following removal of each standing well volume and prior to sample collection. Calibration of field instruments will be undertaken prior to each sampling event.

5. No groundwater samples collected for performance standards evaluation will be field filtered. Samples which are turbid will be noted. Turbid samples will not be decanted in the laboratory to generate sediment free aliquots and will be analyzed on an "as is" basis. In the event that water from a well exhibits turbidity, twice the normal volume for unfiltered samples as outlined below will be collected.

6. Containers for sample collection and preservation requirements will be determined as required by the analytical parameters as detailed in the QAPP. All sample bottles will be provided by the laboratory and will be prepared using standard laboratory validated washing procedures. The sample bottles will be delivered to the Site in sealed containers.

7. A blind field duplicate sample will be collected at a frequency of one per sampling round.

8. Samples for matrix spike analysis and matrix spike duplicate analysis will each be collected at a minimum frequency of one per analytical round of investigative samples. The matrix spike and matrix spike duplicate sample will be taken from a well where samples do not require consideration for turbidity, if possible. Samples will be collected from the well as outlined in (7) above, but at twice the normal volume. The analysis request sheets sent to the laboratory will indicate the sample I.D. of the matrix spike samples.

9. Rinsate blank (equipment blank) samples will be collected at the frequency of one per sampling round.

10. All disposable gloves and rinsings will be placed in DOT approved 55-gallon drums and stored in a designated storage area on Site in accordance with Section A1.4.6.

11. Samples will be labeled noting the well location, date, time and sampler's initials. A separate hard-cover bound field notebook will be maintained describing the sampling history (including: date and time of collection, sample handling and storage, preservation and labeling, field measurements and sample characteristics of each sample taken).

12. Samples will be placed on ice or cooler pack in laboratory supplied coolers after collection and labeling. Samples will be delivered to the laboratory by overnight courier.

13. Samples collected shall be analyzed for beryllium, cadmium, chromium, lead and manganese.

A1.3.3 SURFACE WATER SAMPLING

A1.3.3.1 Purpose/Scope

Surface water samples will be collected from the Coke Pond (see Figure A1.3) on a quarter-annual basis for two (2) years followed by semi-annual sampling for three (3) years). The data obtained will be used to monitor the extent and impact of contaminant migration from the east seep into the Coke Pond. In addition, this information will permit an evaluation of the cover maintenance and seep control programs.

A1.3.3.2 Surface Water Sampling Procedures

Surface water samples will be collected in accordance with the following protocols:

1. A new pair of disposable latex gloves will be used when collecting each surface water sample. Additional glove changes will be made as conditions warrant.

2. The collected surface water samples will not be field filtered. Samples which are identified to be turbid will be noted. Samples which are turbid will not be decanted in the laboratory to generate sediment-free aliquots but will be analyzed on an "as is" basis.

3. Samples will be collected by the grab sample method directly into the precleaned sample containers. Surface water samples which exhibit turbidity will be collected at twice the normal sample volume as outlined below.

4. The appropriate containers for sample collection and sample preservation requirements will be in accordance with the QAPP. All sample bottles will be provided by the contract laboratory and will be precleaned using validated standard laboratory washing procedures. The sample bottles will be delivered to the Site in sealed containers ready for use.

5. All disposable gloves and rinsings will be collected and contained in DOT approved 55-gallon drums and stored in a designated storage area on Site in accordance with Section A1.4.6.

6. Samples will be labeled noting the surface water sampling location, date, time and sampler's initials. A separate hard-cover bound field notebook will be maintained describing the sampling history (including: date and time of collection, sample handling and storage, preservation and labeling, field measurements and sample characteristics of each sample taken).

7. Samples will be placed on ice or cooler packs in laboratory supplied coolers after collection and labeling. Samples will be delivered to the laboratory by courier under chain-of-custody procedures.

8. Samples collected shall be analyzed for aluminum, chromium, copper, lead, nickel and zinc.

A1.3.4 WELL DECOMMISSIONING

Not all existing monitoring wells will be included in the groundwater monitoring program. In addition, five monitoring wells installed by NUS Corporation straddle the residuum/bedrock interface, and was drilled into the bedrock through the waste without first isolating the waste. These wells may act as potential conduits of contamination to the bedrock aquifer. Therefore, it is proposed to decommission four existing NUS monitoring wells as follows:

Well No.	*Description*
CL-02-WP	Well screen straddles residuum/bedrock interface
CL-08-WP	Drilled through the waste
CL-09-WT	Shallow well, not required in monitoring program
CL-11-WP	Unknown lithology

The locations of the monitoring wells to be decommissioned are illustrated on Figure A1.4 while their construction details are presented in Table A1.1. Each well will be decommissioned in accordance with the applicable EPA SOP for well abandonment.

The wells will be decommissioned by overcoring the 2-inch diameter stainless steel riser pipe and screen with a 4-inch diameter diamond core bit for the entire depth of the well. For each well, an attempt will be made to remove the entire length of the well casing. However, if this is not possible, then at least the top 20 feet of 2-inch diameter riser pipe will be removed in accordance with state regulations. Pure bentonite grout will be pumped into the hole via the tremie method to within 3 feet of the surface. The remainder of the borehole will be filled with soil to match the existing grade.

During coring operations continuous examination of the cuttings and air monitoring (PID and explosimeter) will be performed to look for evidence of waste. If waste is encountered, coring activities will be terminated and the hole will be the overdrilled using a 6 1/4-inch I.D.

hollow-stem auger (10-inch diameter borehole) to a depth of 5 feet below the waste. Six-inch diameter steel casing will be installed and grouted in place. The grout will be allowed to set overnight before the coring resumes.

Well CL-08-WP has an approximately 8-inch diameter surface casing to a depth of approximately 30 feet. The top 2 feet of the surface casing will be removed in conjunction with the well decommissioning procedures.

A1.3.5 EQUIPMENT CLEANING

The following protocols will be observed for cleaning all equipment and tools used on Site to prevent cross-contamination. Cleaning procedures will be consistent with Appendix B of the "Engineering Support Branch Standard Operating Procedures and Quality Assurance Manual" (ESBSOPQAM), US-EPA, Region IV, ESD, February 1991.

A1.3.5.1 Drill Rig

Upon mobilization of the drill rig to the Site and prior to commencing drilling, the rig and all associated equipment will be thoroughly brushed and steam cleaned to remove oil, grease, mud and other foreign matter. Augers, cutting bits, samplers, drill steel and associated equipment will be cleaned before initiating drilling at each borehole or well location to prevent cross-contamination from the previous drilling locations. Cleaning will be accomplished by flushing and wiping the components to remove all visible sediments followed by a thorough high-pressure wash and rinsing. Special attention will be given to the threaded sections of the drill rods and split-spoons.

A1.3.5.2 Sampling Tools and Equipment

Prior to the collection of samples for chemical analysis during field sampling, all sampling equipment and tools will be decontaminated with the following rinse sequence:

i) Clean with tap water and detergent (Alconox) using a brush if necessary to remove particulate matter and surface films.
ii) Rinse thoroughly with tap water.
iii) Rinse thoroughly with deionized water.
iv) Rinse thoroughly with organic-free water and allow to air dry as long as possible (a minimum of 15 minutes).
v) If organic-free water is not available, allow equipment to air dry as long as possible (a minimum of 15 minutes). Do not rinse with deionized or distilled water.
vi) Wrap with aluminum foil to prevent contamination if equipment is going to be stored or transported.

Fluids used for cleaning will not be recycled. All wash water, rinse water and decontamination fluids will be stored in containers on Site in accordance with Section A1.4.6.

A1.3.5.3 Well Materials

Prior to installation of the monitoring well, the riser pipe and screens will be cleaned with a detergent (Alconox) high-pressure wash and water rinse. Equipment will be protected from potential contact with solvents between the final rinse and actual use at the sample site.

A1.3.6 WASTE MATERIAL HANDLING

All waste materials generated from the Site investigation program will be secured and placed in interim storage on Site in a designated

area. Solid and liquid waste materials will be segregated and stored separately. All waste materials stored on Site will be logged and the containers labeled.

Drill cuttings and drilling fluids, solvent contaminated decontamination fluids, and discarded personal protective equipment will be secured in 55-gallon drums. A storage tank will be obtained for the interim storage of well development and purge waters. The contents of the tank will be sampled at the end of the field program or earlier, if full, to characterize the liquids for disposal. The final disposition of all stored materials will be carried out in accordance with Federal and State regulations.

All containment drums will be labeled as to the date, time and contents. An inventory of the drums will be maintained.

A1.3.7 SAMPLE LOCATION SURVEY

Upon completion of the upgradient monitoring well installation, the location of the well will be referenced to a set of Site coordinates and stationary datum on Site. The ground elevation at the location as well as the elevation of the top of casing of the monitoring well will be determined by survey.

A1.3.8 ON-SITE HEALTH AND SAFETY PLAN

The Field Sampling Plan as described herein, involves the installation of the groundwater monitoring well and the collection of environmental samples. During this field program, personnel may come in contact with materials that could potentially contain volatile organic compounds and/or other hazardous substances.

During the sampling program, provisions for health and safety will be implemented which are designed to ensure:

i) that personnel working on Site are not exposed to hazardous substances;

ii) that the health and safety of the general public and the environment is not compromised by airborne off-Site migration of contaminated materials due to this project; and

iii) compliance with applicable governmental and non-governmental regulations and guidelines. (In particular, the amended rules of the Occupational Safety and Health Act for Subpart H of Part 1910 (20 CFR 1910.120) and Threshold Limit Values and Biological Exposure Indices for 1987-1988, American Conference of Governmental Industrial Hygienists.)

A detailed Health and Safety Plan which will be implemented during all phases of the FSP is presented in Appendix B.

A1.4 SAMPLE COLLECTION SUMMARY

A total of eight sampling rounds will be conducted over a two-year period, whereby ten groundwater samples and one surface water sample will be collected every three months from the locations indicated on Figure A1.3. The samples that will be collected for chemical analyses are summarized in Table A1.1. The number of samples is consistent with the scope of work presented in this FSP and the QA requirements presented in Submittal A2.

A1.5 SAMPLE LABELING AND CONTROL

A1.5.1 SAMPLE LABELING

A sample numbering system will be used to identify each collected sample by a unique sample number. This system will provide a tracking number to allow for the retrieval and cross-referencing of sample information. A listing of the sample identification numbers with written descriptions of the sample location, sample type, and date will be maintained by appropriate field personnel. The sample numbering system to be used is described as follows:

Example: A - 3482 - MGM-06/06/94-AB

Where:

A	-	Series
3482	-	Job Number
MGM	-	Sampler's Initials
06/06/94	-	Day/Month/Year
AB	-	Sample Identification Designation

The sample number shall be noted on the sample label in waterproof ink. Sample labels shall be firmly affixed to the samples they identify.

QA/QC samples will also be numbered with a unique sample number.

One member of each sampling team will be responsible for recording the sampling activities for each day and will record in his log book the following information for each sample collected:

i) unique sample identification number;
ii) sample matrix;
iii) name of sampler;
iv) sampling location/source;
v) date/time of sample collection;
vi) pertinent data/remarks;

vii) analysis to be conducted;
viii) sampling method;
ix) notes on filtering, preservation and decontamination;
x) number of sample bottles collected;
xi) field analyses performed; and
xii) weather data.

A1.5.2 CHAIN-OF-CUSTODY RECORDS

Chain-of-custody records will be used to track all samples from the time of sampling to the time of arrival of samples at the laboratory. One copy of the completed chain-of-custody record will be retained by designated field personnel. Three copies of the chain-of-custody record will accompany the sample shipment to the laboratory and will be signed by the receiving laboratory's sample custodian. A typical chain-of-custody form and chain of custody procedures are presented in Submittal A2.

A1.5.3 CUSTODY SEALS

Custody seals shall be placed around the neck of each sample container as well as around each cooler. The sample initials will be placed on the seals prior to shipment to provide evidence that the samples have not been tampered with on route to the laboratory. Clear tape will be placed over the seals to ensure that they are not accidentally broken during shipment. The condition of the shipping cooler seal and the general condition of the cooler and the condition of individual container seals will be noted by the laboratory sample custodian on the chain-of-custody record upon receipt of the cooler. If either the cooler or individual sample seals are intact, the sample container will be accepted for analysis.

A1.5.4 SAMPLE CONTAINERS, PRESERVATION, PACKAGING AND SHIPPING

Required sample containers, sample preservation methods, maximum holding times, and filling instructions are summarized in the QAPP. Samples analyzed in accordance with both SW-846, Third Edition and Contract Laboratory Program Routine Analytical Services (CLP RAS) protocols will adhere to the listed holding times.

All samples will be sealed individually inside plastic bags prior to shipment. Samples will be cushioned within the shipment cooler using bubble pack and/or vermiculite. Sample shipments will be iced by placing zip-lock bags of ice and/or cooler packs around the sample containers. Any remaining space will be filled with vermiculite or equivalent.

The chain-of-custody record for each sample shipment will be packaged in a waterproof envelope and sent with the samples to the assigned laboratory. A separate chain-of-custody form will be developed for the contents of each cooler and will be included within the respective cooler.

Samples packaged in coolers as described above will be shipped by overnight courier to the laboratory.

A1.6 SCHEDULE

The proposed Schedule for Activities identified in the FSP is presented on Figure A1.5 of the RD/RA Work Plan. As indicated on the Schedule of Activities, the FSP is estimated to require approximately five years to complete following approval of the RD/RA Work Plan and associated documents.

This schedule assumes that the field work will proceed under favorable weather conditions. Should schedule delays occur, they will be addressed as they occur and all necessary attempts will be made throughout the program to avoid them. Updates of the schedule will be included with each monthly progress report.

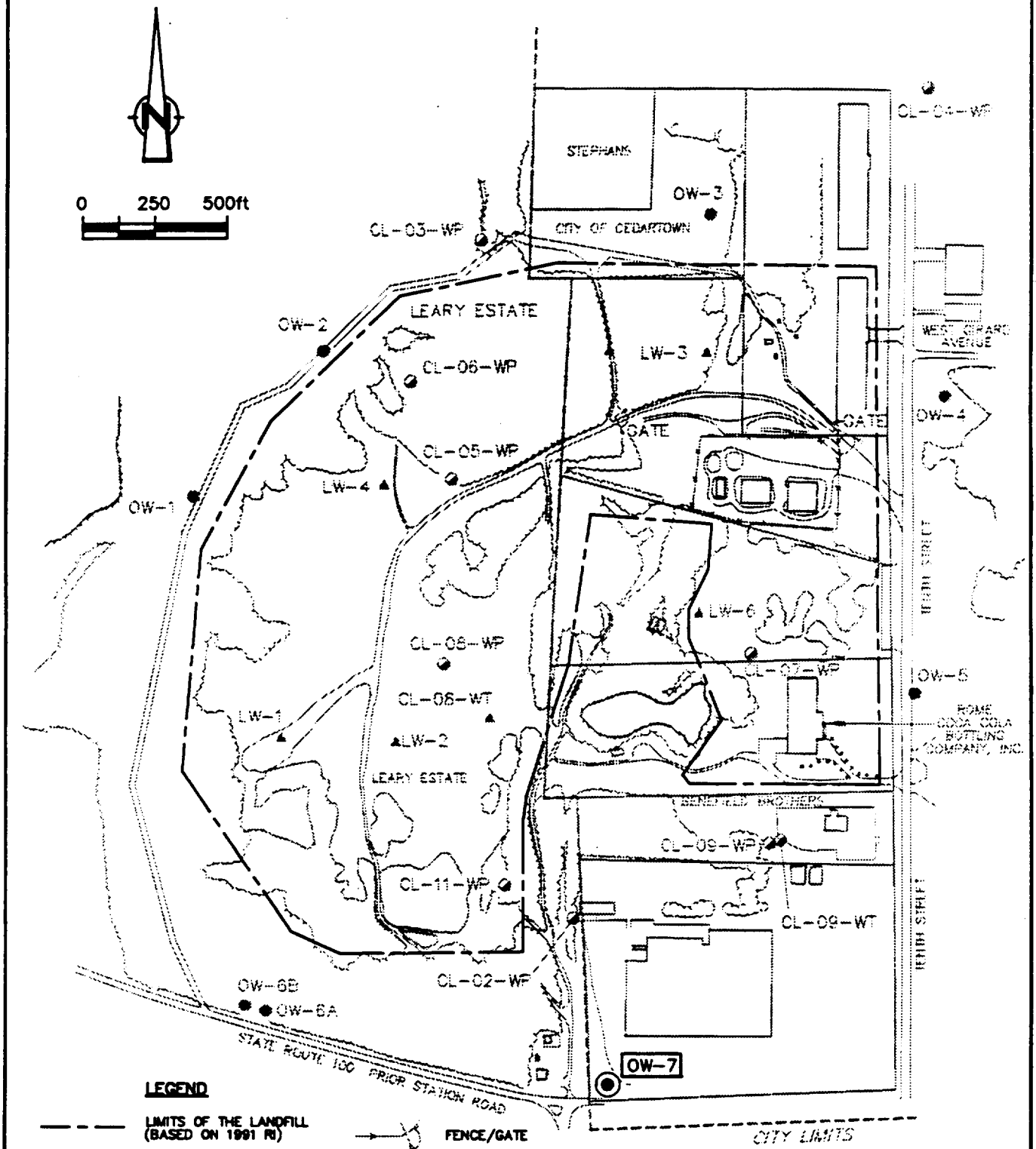


figure A1.1

LOCATION OF PROPOSED UPGRADIENT MONITORING WELL CEDARTOWN MUNICIPAL LANDFILL SITE

Cedartown, Georgia

CRA

3482 (9) JULY 05/94(W) REV.0 (P-31)

SHALLOW
BEDROCK WELL

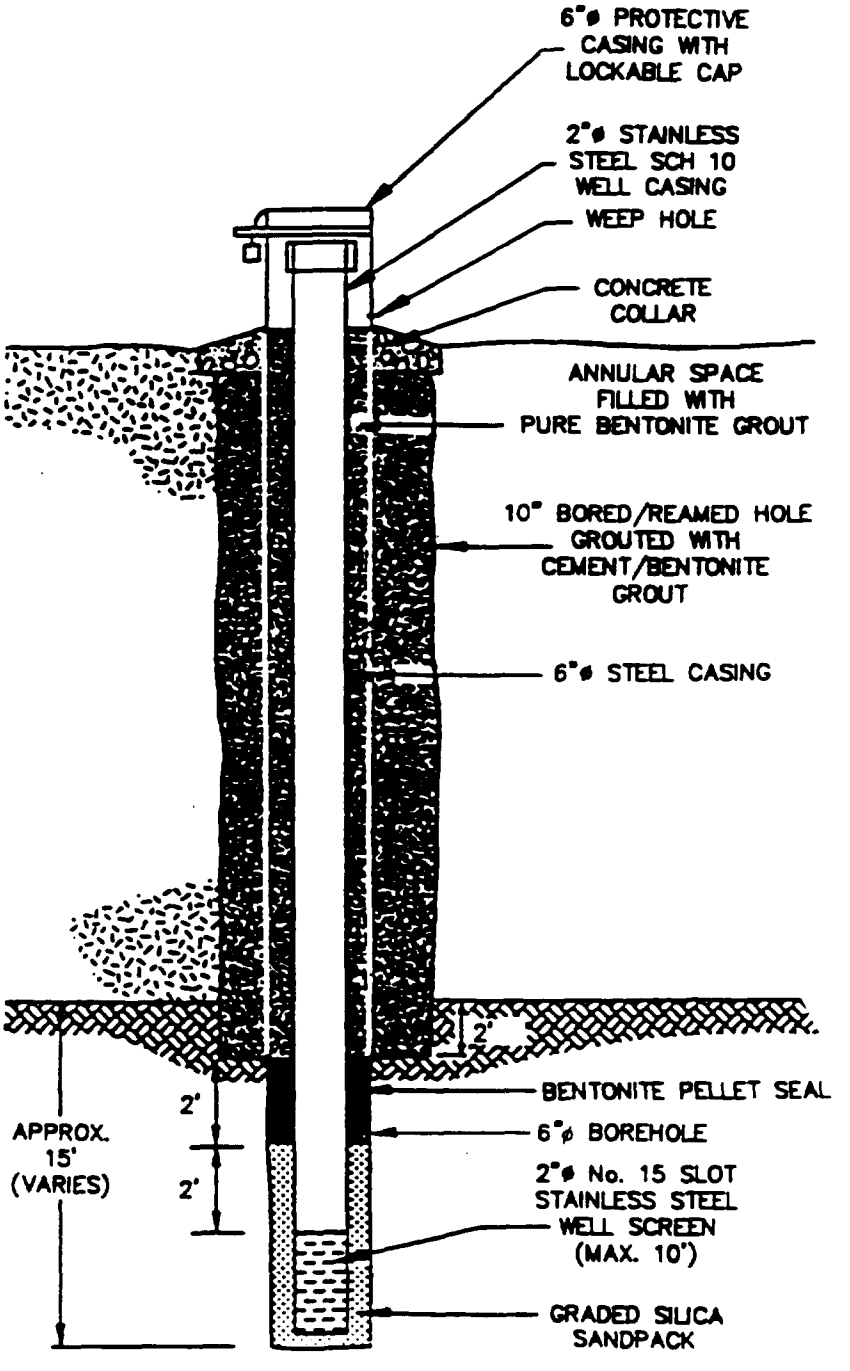


figure A1.2

TYPICAL MONITORING WELL DETAIL
CEDARTOWN MUNICIPAL LANDFILL SITE
Cedartown, Georgia

CRA

3482 (9) JUN 24/94 (W) REV.0

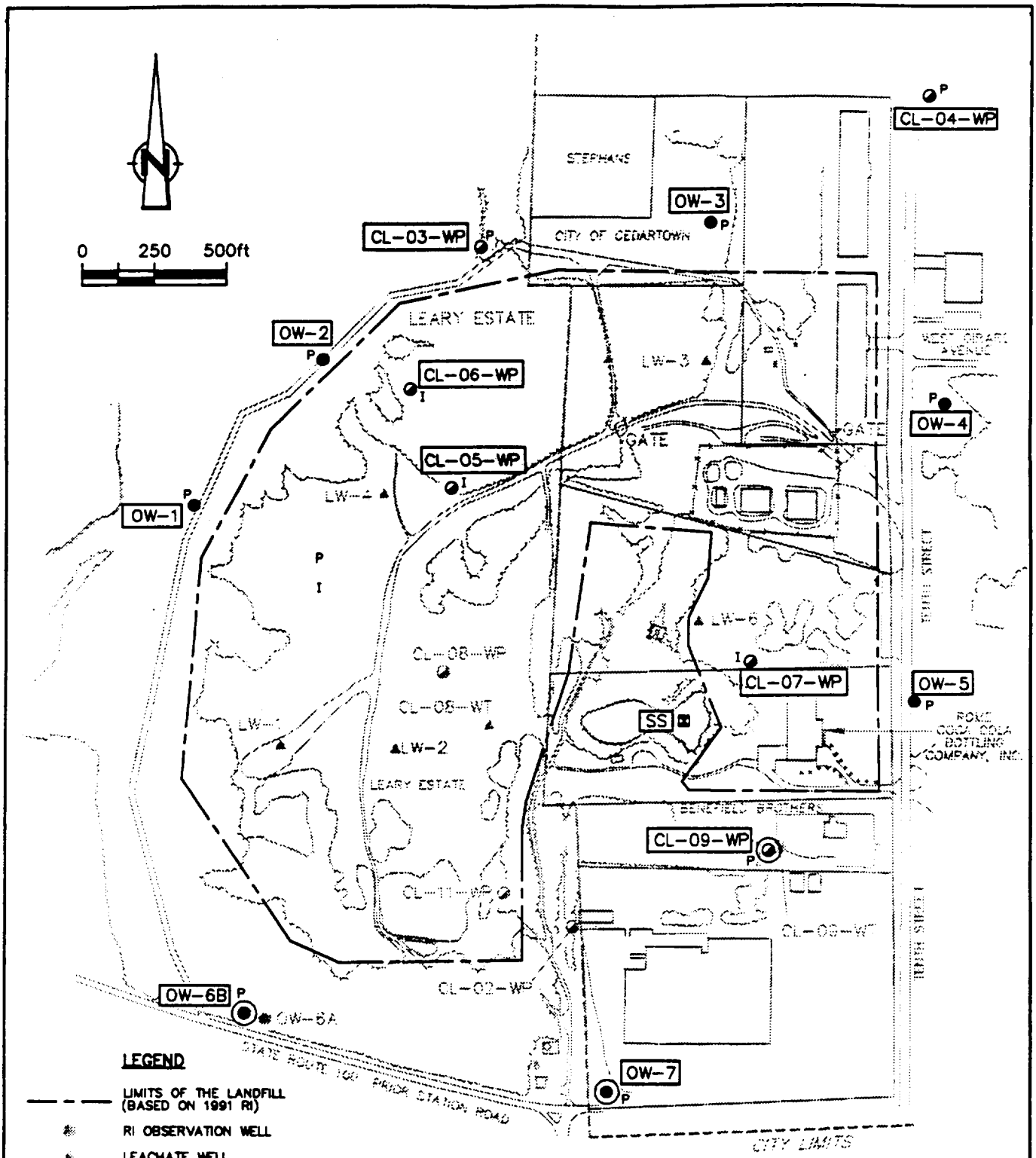


figure A1.3

GROUNDWATER AND SURFACE WATER SAMPLING LOCATIONS
CEDARTOWN MUNICIPAL LANDFILL SITE
Cedartown, Georgia

3482 (9) OCT 27/94(W) REV.2 (P-32)

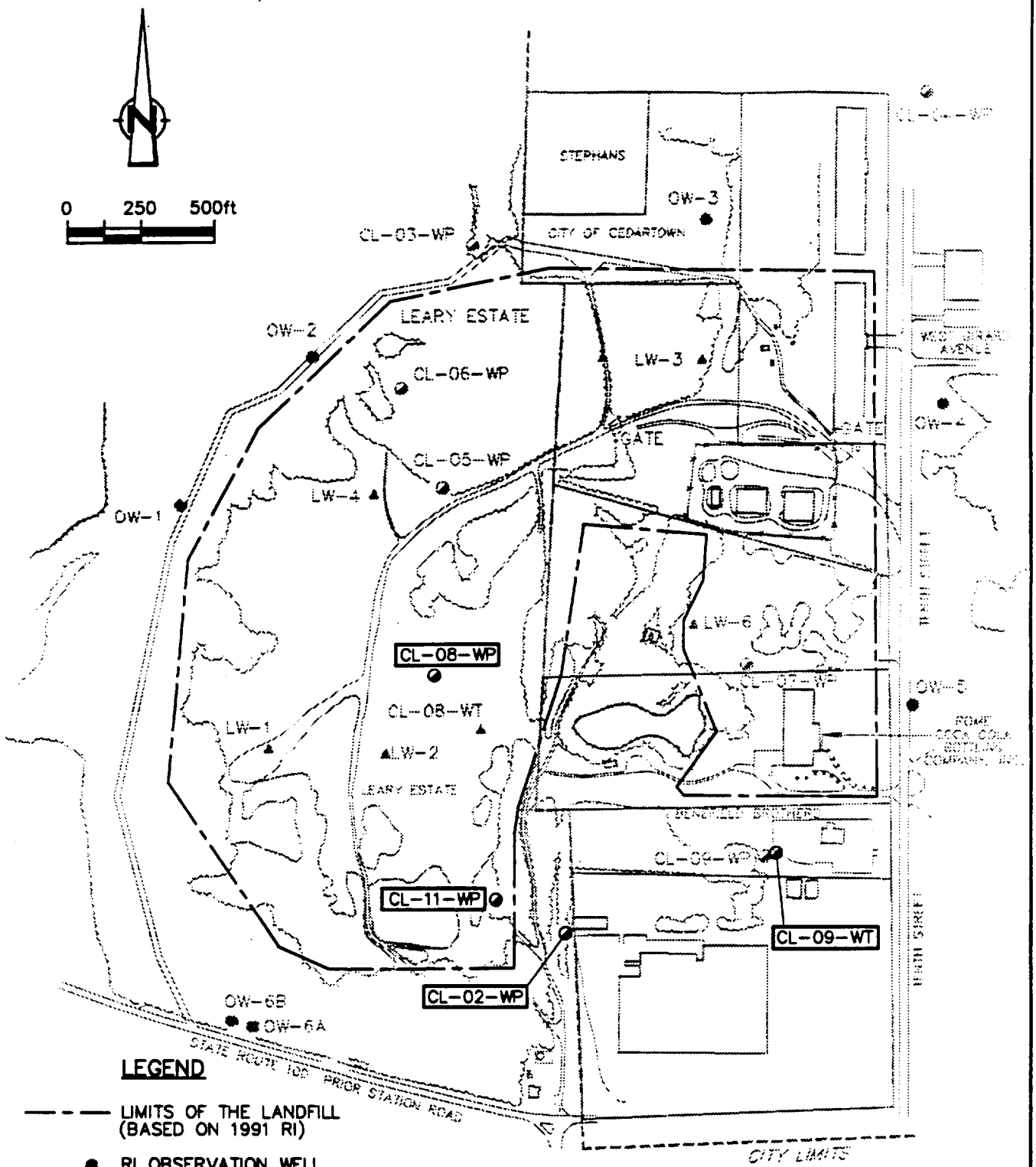
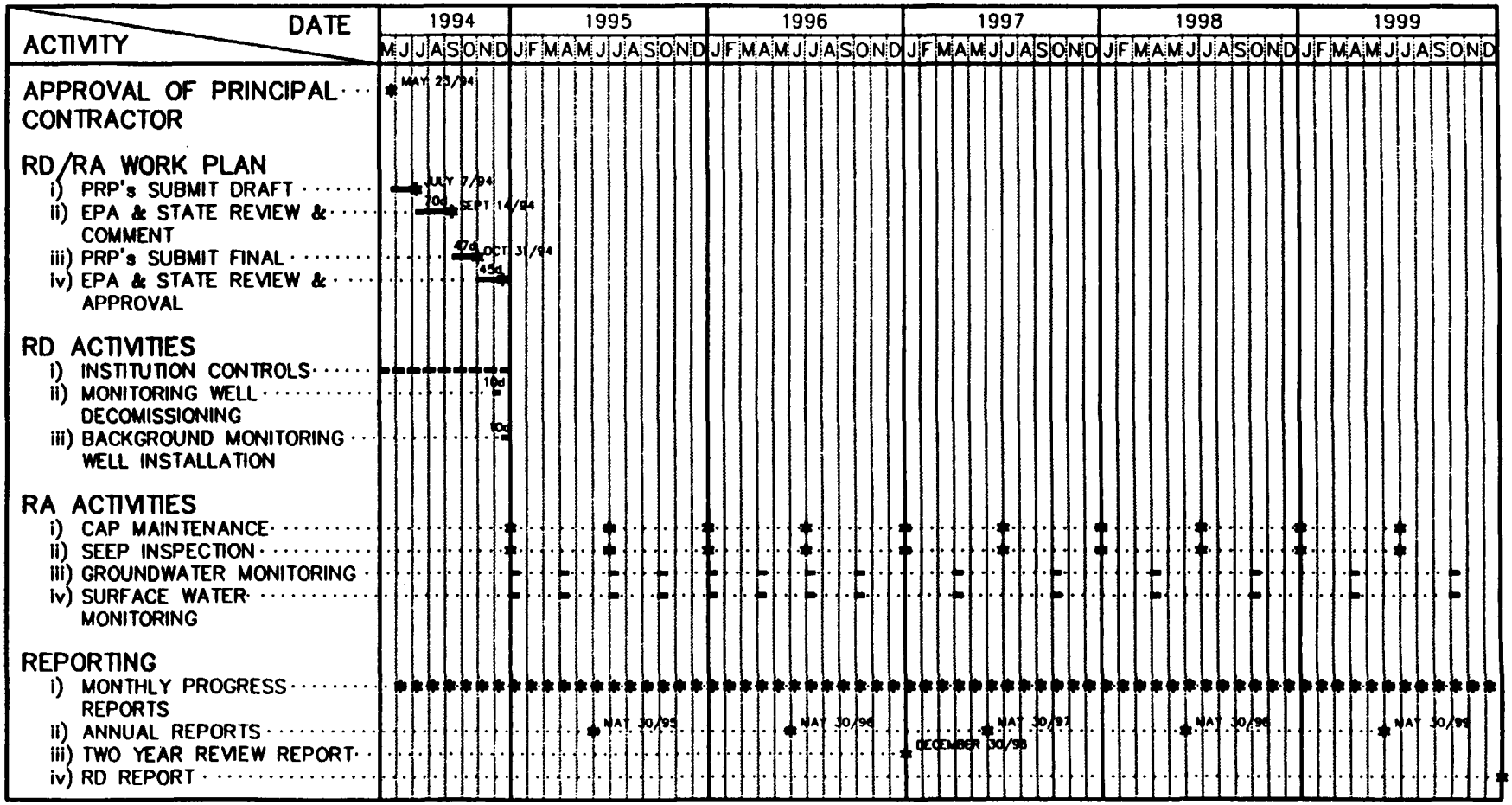


figure A1.4

LOCATION OF WELLS
SCHEDULED FOR DECOMMISSIONING
CEDARTOWN MUNICIPAL LANDFILL SITE
Cedartown, Georgia

3482 (9) OCT 27/94(W) REV.2 (P-30)



LEGEND

* MILESTONE EVENT

——— CONTINUOUS ACTIVITY

- - - - - - EPA/STATE REVIEW

figure A1.5

SCHEDULE OF ACTIVITIES
SELECTED REMEDY
CEDARTOWN MUNICIPAL LANDFILL SITE
Cedartown, Georgia

CRA

3482 (9) OCT 28/94(W) REV.1 (S-01)

TABLE A1.2

SUMMARY OF SAMPLING AND ANALYSIS PLAN
CEDARTOWN MUNICIPAL LANDFILL SITE
CEDARTOWN, GEORGIA

Sample Matrix	*Field Parameters*	*Laboratory Parameters*	*Investigative Samples*	*Rinsate Blanks*	*Field Duplicate*	*MS/MSD (1)*	*Matrix Total*
GROUNDWATER (2)							
Perimeter Bedrock Monitoring Wells (per round of samples)	pH Specific Conductance Temperature Turbidity	Selected TAL-Metals (3)	10	1	1	1/1	14
Interior Monitoring Wells (per round of samples)	pH Specific Conductance Temperature Turbidity	Selected TAL-Metals (3)	3	1 (5)	1 (5)	1/1 (5)	7
SURFACE WATER (2)							
Coke Pond		Selected TAL-Metals (4)	1	--	--	--	1

Notes:

TAL Target Analyte List.

(1) MS/MSD - Matrix Spike/Matrix Spike Duplicate samples

(2) As groundwater and surface water samples are representative of one matrix (i.e. water), the frequency of field QA/QC samples collected (i.e. duplicates, rinsate blanks), and laboratory QA/QC samples (i.e. MS/MSDs) shall be based on the total number of groundwater and surface water investigative samples combined.

(3) Selected metals for groundwater sampling include: beryllium, cadmium, chromium, lead, and manganese.

(4) Selected metals for surface water sampling include: aluminum, chromium, copper, lead, nickel, and zinc.

(5) QC samples will be collected with the interior monitoring well samples only during the sampling events where perimeter monitoring wells are not scheduled for sampling.

ATTACHMENT A1-I

ROCK QUALITY DESIGNATION PROCEDURE

ROCK QUALITY DESIGNATION AS AN INDEX OF ROCK QUALITY

Rock Quality Designation (RQD) is a numerical description of the frequency of natural fractures in bedrock. The following details the procedure for obtaining characteristics of Recovery and RQD.

After coring a determined depth of bedrock, the actual length of core retrieved is measured. This is the total length of rock recovered. All measurements are in feet. The actual length of rock obtained from the core barrel is divided by the length of the "run" (the depth of bedrock cored).

$$\text{Core Recovery} = \frac{\text{Actual Length of Core}}{\text{Length of Run}} \times 100$$

To determine the RQD of the rock, it is necessary to sum the length of all core sections retrieved which are 4 inches or longer and which are hard and sound. All measurements are in feet. This sum of the core lengths is then divided by the length of the run. It is imperative to distinguish between those fractures caused by the drilling operation and those that are true in-situ fractures.

$$\text{Core RQD} = \frac{\text{Total Length of Cores} \geq 4 \text{ inches}}{\text{Length of Run}} \times 100$$

Recovery and RQD measurements are recorded in terms of percent.

Rock Quality Designation (RQD) Percent	*Description of Rock Quality*
0 - 25	Very Poor
25 - 50	Poor
50 - 75	Fair
75 - 90	Good
90 - 100	Excellent

SUBMITTAL A2

QUALITY ASSURANCE PROJECT PLAN (QAPP)
FORMING PART OF SAMPLING AND ANALYSIS PLAN
REMEDIAL DESIGN/REMEDIAL ACTION WORK PLAN
CEDARTOWN MUNICIPAL LANDFILL SITE
CEDARTOWN, GEORGIA

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SUBMITTAL A2

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A2.1 INTRODUCTION

This Quality Assurance Project Plan (QAPP) presents the policies, organization, objectives, functional activities and specific Quality Assurance (QA) and Quality Control (QC) activities designed to achieve the specific data quality goals associated with the Remedial Design/Remedial Action (RD/RA) to be performed at the Cedartown Municipal Landfill Site (Site) located in Cedartown, Georgia. This QAPP also describes the specific protocols which will be followed for sample handling and storage, chain-of-custody procedures, and laboratory and field analyses. The purpose and objectives of this QAPP are to ensure that the analytical results generated during this program are accurate and representative of field conditions. QA/QC and chain-of-custody procedures applicable to all analytical activities for the RD/RA will be in accordance with applicable professional technical standards, USEPA requirements, and government regulations and guidelines, and shall be consistent with the guidelines established in the United States Environmental Protection Agency (USEPA) Region IV document entitled, "Engineering Support Branch Standard Operating Procedures and Quality Assurance Manual" dated April 1, 1986.

This QAPP has been prepared by Conestoga-Rovers & Associates (CRA) in accordance with the USEPA QAPP guidance document, "Interim Guidelines and Specifications for Preparing Quality Assurance Project Plans", (QAM-005/80).

A2.2 PROJECT DESCRIPTION

The RD/RA is designed to gather specific information necessary to define the nature and extent of any existing or potential threat to public health and welfare or to the environment that may occur as a result of a release or threatened release of hazardous substances from the Site. The Field Sample Plan (FSP), as described in Submittal A1 of Appendix A, was developed in accordance with the tasks and activities specified in RD/RA Work Plan. The sampling program to be implemented will include collection and analyses of environmental samples from both groundwater and surface water matrices.

A2.2.1 BACKGROUND

Detailed background information and results of previous studies at the Site have been presented in the document entitled, "Remedial Investigation Report, Cedartown Municipal Landfill Site, Cedartown, Georgia", (CRA, April 1993).

A2.2.2 SCHEDULE

The start of project field activities will be determined by the date upon which approval of this and supporting documentation is granted by USEPA Region IV. Details of the project schedule are presented in Section 9 of the RD/RA Work Plan.

A2.3 PROJECT ORGANIZATION AND RESPONSIBILITY

As the Principal Contractor to the Cedartown Municipal Landfill Site Group (Group), CRA shall have overall responsibility for all phases undertaken during the RD/RA at the Site. CRA shall perform or supervise all field investigations.

CRA shall procure, on behalf of the Group, subcontractors for various aspects of program activities including drilling and analytical testing, as required for data collection. All subcontractors shall be subject to approval by USEPA Region IV.

All subcontractors retained for this investigation shall provide project management as appropriate to their responsibilities. As the Principal Contractor, CRA shall provide administrative oversight and QA/QC of all deliverables. All final project deliverables shall be issued by CRA.

The functional responsibilities of each of the key technical personnel shall be as follows:

Project Coordinator - Group - David Johnson

- general overview of the project to ensure that the Group's objectives are met;
- participation in negotiations with USEPA; and
- managerial guidance to CRA's Project Manager.

Project Manager - CRA - Mike Mateyk

- provides overall project management;
- ensures all resources of CRA are available on an "as-required" basis;
- participation in technical negotiations with the USEPA, and attendance at project meetings on an "as-required" basis;
- managerial and technical guidance to CRA staff;
- liaison between technical committee and Group;
- liaison with USEPA and City of Cedartown; and
- preparation and review of RD/RA reports.

Project Engineer - CRA

- preliminary chemical data interpretation; and
- preparation of RD/RA reports.

Quality Assurance/Quality Control Officer - CRA - Brent Cortelloni

- contracting of analytical laboratory;
- sample tracking and validation of analytical data;
- overview of laboratory activities;
- decide laboratory corrective action; and
- preparation and review of RD/RA reports.

Health and Safety Manager - CRA - Mitch Bergner

- managerial guidance with respect to Health and Safety; and
- review of field decisions regarding Health and Safety.

Site Representative - CRA - John Schwaller

- field supervision of all on-Site activities, including Site preparation, monitoring well installations and sample collection;
- ensure samples are properly collected, stored and subject to the appropriate chain-of-custody protocols;
- supervision and enforcement of safety equipment usage, including the required use of extra equipment if appropriate;
- supervision and inspection of equipment cleaning;
- personnel training in safety equipment usage and emergency procedures;
- maintenance of Exclusion Zone (EZ) and Contaminant Reduction Zone (CRZ) work area;
- implementation of Health and Safety Program;
- suspend work activity due to unsafe working conditions, if required;
- coordination of emergency procedures; and
- maintenance of a hard-cover, bound daily log of RD/RA activities including: date, weather conditions and summary of daily activities.

Project Manager - Analytical Subcontractor

- ensure all resources of laboratory are available on an "as-required" basis;
- coordinate laboratory analyses;

- supervise in-house chain-of-custody;
- schedule sample analyses;
- oversee data review;
- oversee preparation of analytical reports; and
- approve final analytical reports prior to submission to CRA.

Quality Assurance Officer - Analytical Subcontractor

- overview laboratory quality assurance;
- overview QA/QC documentation;
- conduct detailed data review;
- decide laboratory corrective actions, if required; and
- technical representation of laboratory QA procedures.

Sample Custodian - Analytical Subcontractor

- receive and inspect the incoming sample containers;
- record the condition of the incoming sample containers;
- sign appropriate documents;
- verify chain-of-custody and its correctness;
- notify laboratory manager and laboratory supervisor of sample receipt and inspection;
- assign a unique identification number and customer number, and enter each into the sample receiving log;
- with the help of the laboratory manager, initiate transfer of the samples to appropriate lab sections; and
- control and monitor access/storage of samples and extracts.

Primary responsibility for project quality rests with CRA's QA/QC Officer. Ultimate responsibility for project quality rests with CRA's Project Manager. Independent quality assurance will be provided by the Laboratory Project Manager and QA Officer prior to release of all validated data to CRA.

A2.4 QUALITY ASSURANCE OBJECTIVES FOR MEASUREMENT DATA

The overall QA objective is to develop and implement procedures for field sampling, chain-of-custody, laboratory analyses and reporting that will provide accurate data which are legally defensible in a court of law. Specific procedures to be used for sampling QA/QC, chain-of-custody, calibration, laboratory analysis, data reporting, internal quality control, audits, preventive maintenance, and corrective actions are presented in other sections of this QAPP. Procedures relative to sampling are presented in Submittal A1 of this report.

Data quality objectives (DQOs) have been established in accordance with the USEPA guidance document entitled, "Data Quality Objectives for Remedial Response Activities", dated March 1987, to ensure that the data base developed during the RD/RA meets the objectives and quality necessary for its intended use.

DQOs can be classified for the measurement data by defining the level of analytical support assigned to each type of data measurement.

The following defines the different levels of DQOs:

i) Level I - Field screening or analysis using portable instruments;
ii) Level II - Field analyses using more sophisticated portable analytical instruments;
iii) Level III - All analyses performed in off-Site analytical laboratories using EPA procedures other than the Contract Laboratory Program (CLP) Routine Analytical Services (RAS);
iv) Level IV - CLP-RAS performed in a CLP analytical laboratory using CLP procedures; and
v) Level V - Non-standard analytical methods performed in an off-Site laboratory.

DQO Levels I and III will be required for this project.

Level III will be used for the analysis of environmental samples in conjunction with the sampling program, as outlined in the Work Plan.

According to the USEPA document entitled, "Data Quality Objectives for Remedial Response Activities", March 1987, the analyses performed using Level III techniques are designed to provide confirmed identification and quantification of organic and inorganic compounds in water, soil and sediment samples. Level III laboratory analysis provides the following:

i) data to provide engineering design parameters;
ii) data for use in evaluating the Site for further action, e.g., to determine extent of environmental contamination;
iii) data for use in risk assessments; and
iv) detection limits for presence or absence of compounds comparable to Level IV.

Level III protocols incorporate similar laboratory and field QA/QC measures to Level IV.

Field screening of groundwater samples for pH, temperature, conductivity and turbidity will be performed using Level I protocols.

The purpose of this section is to define the goals for the level of QA effort. Objectives for accuracy, precision, sensitivity, completeness, representativeness and comparability of measurement data from the analytical laboratory will be identified. In addition, QA objectives for field measurements will be defined.

A2.4.1 LEVEL OF QA EFFORT

A2.4.1.1 Field QC Sampling

To assess the quality of data resulting from the field sampling program, field duplicate samples, field (rinse) blank samples and matrix spike/matrix spike duplicate (MS/MSD) samples will be collected (where appropriate) and submitted to the analytical laboratory.

Groundwater field QA/QC samples shall be provided by CRA to the analytical laboratory as identified below:

a) Field duplicate samples will be collected at a frequency of one (1) per sample round.

b) Field (rinse) blank samples will be collected at a frequency of one (1) per sample round.

c) Double sample volume will be supplied to the laboratory by CRA in order to perform MS/MSD analyses at a frequency of one (1) per sample round.

The sampling and analysis program is summarized in Table A2.1, which lists the specific parameters to be measured, the number, type and frequency of sampling, and the level of QA effort required for each matrix.

Field rinse blanks will be analyzed to check procedural contamination resulting from sampling device cleaning procedures, ambient conditions at the Site, contamination from sample shipment and/or contamination from sample preservatives. Field duplicate samples will be analyzed to assess the aggregate sampling and analytical reproducibility. MS/MSD samples will be analyzed to evaluate analytical accuracy and precision.

A2.4.1.2 Laboratory QC Effort

A2.4.1.2.1 Accuracy, Precision and Sensitivity of Analyses

The fundamental QA objective with respect to the accuracy, precision and sensitivity of analytical data is to achieve the QC acceptance criteria of each analytical protocol. The sensitivities required for these analyses will be at least the targeted reporting limits listed in Table A2.2 barring any chemical interferences or dilutions required due to elevated concentrations of the subject analyte(s).

The method(s) precision (relative percent difference between duplicate analyses) will be determined from the duplicate analyses of matrix spike samples. A minimum of one (1) sample per analytical round will be spiked and analyzed in duplicate. Analyses will meet the acceptance criteria presented in the appropriate methods identified in Section A2.8.

The method accuracy (percent recovery) for the environmental samples will be determined by spiking selected samples (matrix spikes) with test compounds or analytes. Accuracy will be reported as the percent recovery of the test compound or analyte and will meet acceptance criteria given in the appropriate methods, as identified in Section A2.8.

A2.4.1.2.2 Completeness, Representativeness and Comparability

The QA objective for completeness is to collect and analyze all environmental samples in a manner such that valid data are obtained from a minimum of 80 percent of the samples. Achievement of this objective will rely on the use of strict sample identification and custody procedures, use of standard reference materials, proper instrument calibration and maintenance, analysis of quality control samples, and corrective action any time QC acceptance criteria are exceeded.

An objective of this program is the collection of samples that are representative of the matrix (i.e., groundwater and surface water) from which they were collected. Achievement of this objective will rely on the use of sampling procedures, as described in Submittal A1 that have been designed with the goal of obtaining representative samples.

The QA objective for comparability is the generation of Site characterization data that can be used to make valid comparisons with other analytical data that may be generated in the future. This objective also involves the analysis of the environmental samples collected during the sampling program in a manner that produces results comparable to the results that would be obtained by another laboratory using the same analytical procedure. This objective is achieved by the use of standard materials traceable to the National Bureau of Standards, the use of standardly accepted procedures for sample collection, sample analysis and analysis of quality control samples to validate the analytical results.

A2.4.2 FIELD MEASUREMENTS

Measurement data will be generated in many field activities. These activities include, but are not limited to, the following:

i) documenting time and weather conditions;
ii) determining pH, specific conductivity, turbidity and temperature of groundwater samples;
iii) determining depths in a well;
iv) verifying well development and pre-sampling purge volumes;
v) observation of drill cuttings, sample appearance and other conditions; and
vi) measuring groundwater elevations in wells and at all surface water sampling locations.

The general QA objective for such measurement data is to obtain reproducible and comparable measurements to a degree of accuracy consistent with the use of standardized procedures.

A2.5 SAMPLING PROCEDURES

The procedures for collecting samples and for performing all related field activities are described in detail in Submittal A1 of this report.

A2.5.1 SAMPLE CONTAINERS, PRESERVATION, SAMPLE HOLDING TIMES AND SHIPPING MEANS

Required sample containers, sample preservation methods, shipping means and required sample holding times are presented in Table A2.3. Sample containers will be cleaned in accordance with the procedures described in Attachment A2-I.

A2.5.2 FIELD DECONTAMINATION OF SAMPLING EQUIPMENT

Procedures to be used for sampling equipment and drill rig cleaning are presented in Submittal A1 of this report.

A2.6 SAMPLE CUSTODY AND DOCUMENT CONTROL

The following documentation procedures will be used during sampling and analysis to provide chain-of-custody control during transfer of samples from collection through storage. Recordkeeping documentation will include use of the following:

i) field logbook (bound with numbered pages) to document sampling activities in the field;
ii) labels to identify individual samples;
iii) chain-of-custody record sheet to document analyses to be performed; and
iv) laboratory sample custody logbook.

A2.6.1 FIELD LOGBOOK

In the field, the sampler will record the following information in the field logbook (bound) for each sample collected:

i) unique sample identification number;
ii) sample matrix;
iii) name of sampler;
iv) sample source;
v) time and date;
vi) pertinent data (i.e. depth, water surface elevation, pumping method);
vii) analysis to be conducted;
viii) sampling method (i.e. pump type);
ix) appearance of each sample (i.e. color, turbidity, sediment);
x) preservative added, if any;
xi) number of sample bottles collected;
xii) analyses performed in the field (temperature, pH, specific conductance, turbidity); and
xiii) pertinent weather data.

Each field logbook page will be signed by the sampler.

All field logbooks, sample labels and chain-of-custody records will be recorded in waterproof, non-erasable ink. Entry errors, if made, shall be voided by crossing out with a single line and the corrected information will be inserted. All such corrections shall be initialed and dated by the person making the entry.

A2.6.2 SAMPLE IDENTIFICATION

A sample numbering system will be used to identify each collected sample by unique sample number. This system will provide a tracking number to allow retrieval and cross-referencing of sample information. A listing of the sample identification numbers with written descriptions of sample location, type and date will be maintained by CRA. The sample numbering system to be used is described as follows:

Example:		W-3482-MGM-06/06/94-AB
Where:		
W	-	Matrix - Water
3482	-	Job Number
MGM	-	Sampler's Initials
06/06/94	-	Day/Month/Year
AB	-	Sample Identification Designation

The sample number shall be noted on the sample label in waterproof ink. Sample labels shall be firmly affixed to the samples they identify.

QA/QC samples will also be numbered with a unique sample number.

A2.6.3 CHAIN-OF-CUSTODY RECORD

A chain-of-custody form will be completed to document the transfer of sample containers. Figure A2.2 illustrates a typical chain-of-custody form. Custody seals will be placed around the neck of each sample container as well as around each cooler as presented in Submittal A1. The cooler will then be sealed with packing tape. Sample container labels will include sample number, place of collection and date and time of collection. Samples may be held up to 48 hours prior to shipment to the laboratory/subcontractor provided that the samples are refrigerated at 4°C (±2°C) for this specified time.

The chain-of-custody record, completed at the time of sampling, will contain, but not be limited to, the sample number, date and time of sampling, and the name of the sampler. The record sheet will be signed, timed and dated by the sampler when transferring the samples. Custody transfers will be recorded for each individual sample. For example, if samples are split and sent to more than one laboratory, a record sheet will accompany each sample. The number of custodians in the chain of possession will be kept to a minimum. The chain-of-custody forms will be returned to CRA.

Each cooler being shipped to the laboratory will contain a chain-of-custody form. The chain-of-custody form will consist of four (4) copies which will be distributed to the shipper, the receiving laboratory, and two (2) copies to CRA. The shipper will maintain his copy while the other three (3) copies will be enclosed in a waterproof envelop within the cooler with the samples. The laboratory, upon receiving the samples, will complete the three (3) remaining copies. The laboratory will maintain one (1) copy for their records. One (1) copy will be returned to CRA upon receipt of the samples by the laboratory. One (1) copy will be returned to CRA with the data deliverables package. The sample number of each sample shipped will be recorded on the sheet. The cooler will then be sealed properly for shipment.

Upon receipt of the cooler at the laboratory, the cooler and the seal and each sample container custody seal will be inspected by the

designated sample custodian. The condition of the cooler and the sample container custody seals will be noted on the chain-of-custody record sheet by the sample custodian. If either of the cooler seal or the individual sample container custody seals are intact, the sample containers will be accepted for analyses. The sample custodian will document the date and time of receipt of the cooler, and sign the form.

If damage or discrepancies are noticed, they will be recorded in the remarks column of the record sheet, dated and signed. Any damage or discrepancies will be reported to the lab supervisor who will inform the lab manager and QA Officer.

Completed chain-of-custody forms describing the transport to and receipt at the lab are required to be returned to CRA with the hard copy of the analytical report in order to facilitate data validation.

A2.6.4 SAMPLE DOCUMENTATION IN THE LABORATORY

Each sample or group of samples shipped to the laboratory for analysis will be given a unique identification number. The laboratory sample custodian will record the client name, number of samples and date of receipt of samples in the Sample Control Logbook.

The laboratory will be responsible for maintaining analytical logbooks and laboratory data as well as a sample (on hand) inventory for submittal to CRA on an "as-required" basis. Raw laboratory data produced from the analysis of samples submitted for this program will be inventoried and maintained by the laboratory for a period of five (5) years at which time CRA will advise the laboratory regarding the need for additional storage.

A2.6.5 STORAGE OF SAMPLES

After the sample custodian has completed the chain-of-custody forms and the incoming sample log, the chain-of-custody forms will be checked to ensure that all samples are stored in the appropriate locations. All samples will be stored within an access controlled custody room and will be maintained at 4°C (±2°C) until all analytical work is complete.

A2.6.6 SAMPLE DOCUMENTATION

Evidentiary files for the entire project shall be inventoried and maintained by CRA and shall consist of the following:

A Project Plan
B Project Logbooks
C Field Data Records
D Sample Identification Documents
E Chain-of-custody Records
F Lab Data, etc.
G Correspondence
H Report Notes, Calculations, etc.
I References, Copies of Pertinent Literature
J Miscellaneous - Photos, Maps, Drawings, etc.
K Final Report

The evidentiary file materials shall be the responsibility of the Project Manager with respect to maintenance and document removal.

A2.7 CALIBRATION PROCEDURES AND FREQUENCY

A2.7.1 LABORATORY INSTRUMENT CALIBRATION

Calibration of laboratory equipment will be based on approved written procedures. Records of calibration, repairs or replacement will be filed and maintained by the designated laboratory personnel performing quality control activities. These records will be filed at the location where the work is performed and will be subject to QA audit. For all instruments, the laboratory will maintain factory-trained repair staff with in-house spare parts or maintain service contracts with vendors.

Specific calibration procedures that will be used during chemical analyses of the environmental samples collected during the RD/RA shall be in accordance with the analytical methods presented in Section A2.8.

A2.7.2 FIELD INSTRUMENT CALIBRATION

The field instruments which may be used to make measurements in the field are the following:

i) portable field pH meter (temperature compensated);
ii) portable field conductivity meter; and
iii) portable field turbidity meter.

The procedures that will be used to calibrate and maintain these instruments are presented in Attachment A2-II.

A2.8 ANALYTICAL PROCEDURES

The analytical methodologies that will be used for chemical analysis of the environmental samples collected during the RD/RA are presented in Table A2.4.

A2.8.1 REPORTING LIMIT REQUIREMENTS

The data used to conduct the RD/RA will have targeted reporting limits that are consistent with those presented in Table A2.2 barring any chemical interferences or dilutions required due to elevated concentrations of the subject analyte(s). The methods for performing these analyses are presented in Table A2.4.

A2.8.2 QUANTIFICATION

The procedures for quantification of analytes will be consistent with those outlined in the appropriate specific analytical methods.

A2.9 DATA REDUCTION, VALIDATION ASSESSMENT AND REPORTING

The laboratory will perform analytical data reduction and validation in-house under the direction of the laboratory QA Officer. The laboratory QA Officer will be responsible for assessing data quality and advising of any data which were rated "preliminary" or "unacceptable" or other qualifications based on the QC criteria outlined in USEPA SW-846 "Test Methods for Evaluating Solid Waste", 3rd Edition, (Revision 1, First Update) November 1990 which would caution the data user of possible unreliability. Data reduction, validation and reporting by the laboratory will be conducted as follows:

- Raw data produced and checked by the responsible analyst is turned over for independent review by another analyst.

- The area supervisor reviews the data for attainment of quality control criteria presented in the referenced analytical methods.

- Upon completion of all reviews and acceptance of the raw data by the laboratory operations manager, a computerized report will be generated and sent to the laboratory QA Officer.

- The laboratory QA Officer will complete a thorough inspection of all reports.

- The QA Officer and area supervisor will decide whether any sample reanalysis is required.

- Upon acceptance of the preliminary reports by the QA Officer, final reports will be generated and signed by the laboratory manager.

CRA's QA/QC Officer will conduct an evaluation of data reduction and reporting by the laboratory. These evaluations will consider the finished data sheets, rinsate blank data, field duplicate data, and recovery data for matrix spikes. The material will be checked for legibility, completeness, correctness, and the presence of requisite dates, initials and

signatures. The results of these checks will be assessed and reported to the project managers noting any discrepancies and their effect upon the acceptability of the data. All information obtained from QA/QC checks will be discussed in the final RD/RA Report.

Validation of the analytical data will also be performed by CRA's QA/QC Officer. Assessment of analytical and field data will include checks for data consistency by looking for comparability of duplicate analyses, potential sample contamination as indicated by results of rinsate blank sample analyses, laboratory QA procedures, adherence to accuracy and precision criteria, transmittal errors and anomalously high or low parameter values. The results of these data validations will be reported to the project managers, noting any discrepancies and their effect upon the acceptability of the data.

Raw data from field measurements and sample collection activities that are used in project reports will be appropriately identified and appended to the report. Where data have been reduced or summarized, the method of reduction will be documented in the report. In addition, field data will be audited for anomalously high or low values that may appear to be inconsistent with other data.

The data packages supplied by the Analytical Subcontractor will contain the following:

i) a case narrative that includes a summary of analytical methods used and a description of any unusual action or conditions;
ii) dates of sample receipt, preparation and analysis;
iii) method blank sample analysis summaries;
iv) matrix spike/matrix spike duplicate (MS/MSD) recovery data and controls limits;
v) check sample data;
vi) executed chain-of-custody forms; and
vii) data forms for all compounds.

A2.10 INTERNAL QUALITY CONTROL CHECKS AND FREQUENCY

A2.10.1 FIELD QC

Quality control procedures for field measurements will be limited to checking the reproducibility of the measurement in the field by obtaining multiple readings and by calibrating the instruments (where appropriate).

Quality control of field sampling will involve collecting field duplicates and field (rinsate) blanks in accordance with the applicable procedures described in the FSP (Submittal A1 of this report) and in accordance with the frequencies provided in Section A2.4.1.1.

A2.10.2 LABORATORY QC

Specific procedures related to internal laboratory QC samples (namely blanks, matrix spike/matrix spike duplicates, and blind check samples) are detailed in the following subsections.

A2.10.2.1 Blanks

A reagent blank will be analyzed by the laboratory at a frequency of one (1) blank per analytical round. The reagent blank, an aliquot of analyte-free water will be carried through the entire analytical procedure.

A2.10.2.2 Matrix Spike/Matrix Spike Duplicates

A matrix spike/matrix spike duplicate (MS/MSD) sample will be analyzed at a minimum frequency of one (1) per analytical round of investigative samples. Table A2.5 presents a summary of the analytes and acceptable recovery criteria. Percent spike recoveries will be used to evaluate

analytical accuracy while the relative percent difference (RPD) between the spike and matrix spike duplicate will be used to assess analytical precision.

A2.10.2.3 Blind Check Samples

As supplied by USEPA, an analytical batch may contain a check sample. In general, the check sample will be obtained from USEPA and supplied to CRA. The analytes employed in the check sample will be a representative subset of the compounds of interest. The results of the check sample analysis will be used to assess analytical accuracy.

A2.11 PERFORMANCE AND SYSTEM AUDITS AND FREQUENCY

For the purposes of external evaluation, performance evaluation check samples from the USEPA and various State agencies are analyzed periodically by the Analytical Subcontractor.

Internally, the evaluation of data from these samples is done on a continuing basis over the duration of a given project.

CRA's QA/QC Officer may carry out performance and/or systems audits to ensure that data of known and defensible quality consistently are produced during the program.

System audits are qualitative evaluations of all components of field and laboratory quality control measurement systems and they determine if the measurement systems are being used appropriately. The audits may be carried out before all systems are operational, during the program, or after the completion of the program. Such audits typically involve a comparison of the activities given in the QA/QC plan described herein, with activities actually scheduled or performed. A special type of system audit is the data management audit. This audit addresses only data collection and management activities.

The performance audit is a quantitative evaluation of the measurement systems used for a monitoring program. It requires testing the measurement systems with samples of known composition or behavior to evaluate precision and accuracy. A performance audit may be carried out by or under the auspices of the Analytical QA/QC Officer without the knowledge of the analyst during each sampling event for this program.

In addition, one (1) external QA audit may be conducted by CRA prior to the analysis of any investigatory samples. It should be noted, however, that any additional external QA audits will only be performed if deemed necessary, by either the Group or CRA's QA/QC Officer. The project laboratory(ies) may also undergo QA audit(s) by the USEPA, if so requested.

A2.12 PREVENTIVE MAINTENANCE

This section applies to both field and laboratory equipment. Specific preventive maintenance procedures for field equipment will be consistent with the manufacturer's guidelines. Specific preventive maintenance protocols for laboratory equipment will be consistent with the Analytical Subcontractor's standard operating procedures.

Manufacturer's service contracts provide primary maintenance for most major instruments (i.e., atomic absorption spectrometers, analytical balances, etc.). All aspects of routine and non-routine instrument maintenance are recorded in logbooks, and the logbook shall be dedicated to each instrument.

A2.13 SPECIFIC ROUTINE PROCEDURES USED TO ASSESS DATA PRECISION, ACCURACY AND COMPLETENESS

A2.13.1 QA MEASUREMENT QUALITY INDICATORS

A2.13.1.1 Precision

Precision will be assessed by comparing the analytical results between duplicate samples (see Equation 1, Section A2.13.2.).

A2.13.1.2 Accuracy

Accuracy will be assessed by comparing a set of analytical results to the accepted or "true" values that would be expected. In general, MS/MSD and check sample recoveries will be used to assess accuracy.

A2.13.1.3 Outliers

Procedures discussed previously will be followed for documenting deviations. In the event a result deviates significantly from established control limits (USEPA SW-846 Third Edition, Revision 1, 1st Update, November 1990), this deviation will be noted and its effect on the quality of the remaining data assessed and documented.

A2.13.1.4 Completeness

Completeness will be assessed by comparing the number of valid results (as determined by CRA's QA/QC Officer) to the total possible number of results using the following formula:

$$\text{Completeness} = \frac{\text{Valid Data Obtained}}{\text{Total Data Planned}} \times 100.$$

The required level of completeness for laboratory analyses will be 80 percent.

A2.13.2 STATISTICAL EVALUATIONS

Standard statistical formulae shall be used in examination of the data and determination of their precision and accuracy. Additional statistical formulae which will be applied include:

i) Relative Percent Difference (RPD)

The relative percent difference of duplicate analyses will be used to assess analytical precision, and will be evaluated as follows:

$$RPD = \frac{|X_1 - X_2|}{\frac{X_1+X_2}{2}} \times 100 \qquad \text{(Equation 1)}$$

where:

X_1 = result of original analysis

X_2 = result of duplicate analysis

ii) Percent Recovery

Percent recovery of spikes will be used to assess analytical accuracy and audit check sample performance, and will be evaluated as follows:

$$\text{Matrix Spike Recovery} = \frac{A-B}{C} \times 100 \qquad \text{(Equation 2)}$$

where:

A = the analyte concentration determined experimentally from the spiked sample;

B = the background level determined by a separate analysis of the unspiked sample; and

C = the amount of the spike added.

A2.14 CORRECTIVE ACTION

The need for corrective action may be identified by system or performance audits or by standard QC procedures. The essential steps in the corrective action system will be:

i) checking the predetermined limits for data acceptability beyond which corrective action is required;

ii) identifying and defining the problems;

iii) assigning responsibility for investigating the problem;

iv) investigating and determining the cause of the problem;

v) determining a corrective action to eliminate the problem (this may include reanalysis or resampling and reanalysis);

vi) assigning and accepting responsibility for implementing the corrective action;

vii) implementing the corrective action and evaluating the effectiveness;

viii) verifying that the corrective action has eliminated the problem; and

ix) documenting the corrective action taken.

For each measurement system, the Analytical QA/QC Officer will be responsible for initiating the corrective action and the laboratory supervisor will be responsible for implementing the corrective action. The corrective action taken will depend upon the QA/QC data that did not meet the necessary criteria, and may range from qualifying the data to resampling at the Site. All problems requiring corrective action and the corrective action employed to resolve the problem will be reported.

Specific corrective actions will be dependent upon the QA/QC data which did not meet the specified criteria.

Data qualification procedures will be consistent with the guidelines outlined in USEPA's document entitled, "Laboratory Data Validation Functional Guidelines for Evaluating Inorganics Analysis", (October 1989 revision). The degree of corrective action will be dependent upon the severity of QA/QC problems. For example, slight sample holding time exceedences or low level method blank detections would result in sample data qualifications, while severe QA/QC problems such as excessive holding time exceedences, improper instrument calibration, or lab duplicate analyses whose relative standard deviation (RSD) exceeds 20% would result in qualifying the associated sample data as unusable.

Resampling would be required only if gross sample collection or handling errors were noted. Such errors may include sample mislabeling, improper sample preservation or gross sample contamination from outside sources.

Corrective action would always be reported to CRA's Project Manager who would immediately notify USEPA's RPM. Corrective action taken by the laboratory would be noted in the laboratory's final analytical reports and corrective action taken by CRA would be documented in the quality assurance report to management (see Section A2.15).

Field corrective action will consist of instrument recalibration, replacement of probes, or the instrument itself, and will be recorded in the field log book.

A2.15 QUALITY ASSURANCE REPORT TO MANAGEMENT

CRA's Project Manager will receive reports on the performance of the measurement system and the data quality following each sampling round and at the conclusion of the project.

Minimally, these reports will include:

i) assessment of measurement quality indicators (i.e. data accuracy, precision and completeness);

ii) results of system audits; and

iii) QA problems and recommended solutions.

CRA's QA/QC Officer will be responsible within the organizational structure for preparing these periodic reports. The final report for the project will also include a separate QA section which will summarize data quality information contained in the periodic QA/QC reports to management, and will detail an overall data assessment and validation in accordance with the data quality objectives outlined in this QAPP.

CHAIN OF CUSTODY RECORD

CRA
CONESTOGA–ROVERS & ASSOCIATES

SHIPPED TO (Laboratory Name):

REFERENCE NUMBER:

SAMPLER'S SIGNATURE: _____ PRINTED NAME: _____

SEQ. No.	DATE	TIME	SAMPLE No.	SAMPLE TYPE	No. OF CONTAINERS	PARAMETERS	REMARKS
			TOTAL NUMBER OF CONTAINERS			HEALTH/CHEMICAL HAZARDS	

RELINQUISHED BY: ① _____	DATE: TIME:	RECEIVED BY: ② _____	DATE: TIME:
RELINQUISHED BY: ② _____	DATE: TIME:	RECEIVED BY: ③ _____	DATE: TIME:
RELINQUISHED BY: ③ _____	DATE: TIME:	RECEIVED BY: ④ _____	DATE: TIME:

METHOD OF SHIPMENT: WAY BILL No.

White –Fully Executed Copy
Yellow –Receiving Laboratory Copy
Pink –Shipper Copy
Goldenrod –Sampler Copy

SAMPLE TEAM:

RECEIVED FOR LABORATORY BY:

DATE: TIME:

figure A2.1

CHAIN OF CUSTODY FORM
CEDARTOWN MUNICIPAL LANDFILL SITE
Cedartown, Georgia

CRA

3482 (9) JUNE 15/94(W) REV.0 (F-01)

TABLE A2.1

SUMMARY OF SAMPLING AND ANALYSIS
CEDARTOWN MUNICIPAL LANDFILL SITE RD/RA
CEDARTOWN, GEORGIA

Sample Matrix	*Field Parameters*	*Laboratory Parameters*	*Investigative Samples*	*Rinsate Blanks*	*Field Duplicate*	*MS/MSD (1)*	*Matrix Total*
GROUNDWATER (2)							
Perimeter Bedrock Monitoring Wells (per round of samples)	pH Specific Conductance Temperature Turbidity	Selected TAL-Metals (3)	10	1	1	1/1	14
Interior Monitoring Wells (per round of samples)	pH Specific Conductance Temperature Turbidity	Selected TAL-Metals (3)	3	1 (5)	1 (5)	1/1 (5)	7
SURFACE WATER (2)							
Coke Pond		Selected TAL-Metals (4)	1	--	--	--	1

Notes:

TAL Target Analyte List.

(1) MS/MSD - Matrix Spike/Matrix Spike Duplicate samples

(2) As groundwater and surface water samples are representative of one matrix (i.e. water), the frequency of field QA/QC samples collected (i.e. duplicates, rinsate blanks), and laboratory QA/QC samples (i.e. MS/MSDs) shall be based on the total number of groundwater and surface water investigative samples combined.

(3) Selected metals for groundwater sampling include: beryllium, cadmium, chromium, lead, and manganese.

(4) Selected metals for surface water sampling include: aluminum, chromium, copper, lead, nickel, and zinc.

(5) QC samples will be collected with the interior monitoring well samples only during the sampling events where perimeter monitoring wells are not scheduled for sampling.

TABLE A2.2

TARGETED REPORTING LIMITS FOR INORGANICS ANALYSES
CEDARTOWN MUNICIPAL LANDFILL SITE RD/RA
CEDARTOWN, GEORGIA

Analyte	*Targeted Reporting Limits** (µg/L)
Aluminum	200
Beryllium	5
Cadmium	5
Chromium	10
Copper	25
Lead	5
Manganese	15
Nickel	40
Zinc	20

Note:

* Targeted reporting limits are provided for guidance only and may not always be technically achievable.

TABLE A2.3

CONTAINER, PRESERVATION, SHIPPING AND PACKAGING REQUIREMENTS
CEDARTOWN MUNICIPAL LANDFILL RD/RA
CEDARTOWN, GEORGIA

	Analysis	*Sample Containers*	*Preservation*	*Maximum(1) Holding Times*	*Volume of Sample*	*Shipping*	*Normal Packaging*
A.	Water Samples (surface water and groundwater)						
	Metals	1 1-Liter polyethylene bottle with polyethylene-lined closure	10% HN03 to pH <2 cool to 4°C (±2°C)	6 months	Fill to shoulder of bottle	Overnight courier	Bubble pack

Note:

(1) All holding times are based on the date of sample collection.

TABLE A2.4

ANALYTICAL METHODS OF ANALYSIS
CEDARTOWN MUNICIPAL LANDFILL SITE RD/RA
CEDARTOWN, GEORGIA

Matrix	*Parameter*	*Extraction Methods (1)*	*Analytical Methods*
Groundwater/Surface Water	Aluminum	3005/3010/3020	6010
	Beryllium	3005/3010/3020	6010
	Cadmium	3005/3010/3020	6010
	Chromium	3005/3010/3020	6010
	Copper	3005/3010/3020	6010
	Lead	3005/3010/3020	7421
	Manganese	3005/3010/3020	6010
	Nickel	3005/3010/3020	6010
	Zinc	3005/3010/3020	6010

Reference: (1) "Test Methods for Evaluating Solid Waste, Physical/Chemical Methods", USEPA SW-846, Third Edition, Revision 1, Update 1, 1990.

TABLE A2.5

MATRIX SPIKE/MATRIX SPIKE DUPLICATE RECOVERY CONTROL LIMITS - INORGANICS(1) (%) CEDARTOWN MUNICIPAL LANDFILL SITE RD/RA CEDARTOWN, GEORGIA

Analyte	*Water Recovery Control Limits*
Aluminum	75 - 125 (20)
Beryllium	75 - 125 (20)
Cadmium	75 - 125 (20)
Chromium	75 - 125 (20)
Copper	75 - 125 (20)
Lead	75 - 125 (20)
Manganese	75 - 125 (20)
Nickel	75 - 125 (20)
Zinc	75 - 125 (20)

Note:

(1) Values in parentheses indicate maximum acceptable relative percent differences (RPD) between duplicate analysis.

ATTACHMENT A2-I

SAMPLE BOTTLE CLEANING PROCEDURES

ATTACHMENT A2-I
PREPARATION OF DISPOSABLE SAMPLE CONTAINERS

1.0 GENERAL

No sample container (with the exception of the glass and plastic compositing containers) will ever be reused. All disposable sample containers will be stored in their original packing containers. When packages of uncapped sample containers are opened, they will be placed in new plastic garbage bags and sealed to prevent contamination during storage. Specific precleaning instructions for disposable sample containers are given in the following sections. These instructions apply to precleaned disposable sample containers whether they are purchased from a contractor or are precleaned by USEPA personnel.

1.1 One Liter Polyethylene Bottle for Metals and General Inorganics

i) Wash polyethylene bottles and caps in hot water with laboratory detergent;

ii) rinse both with nitric acid solution;

iii) rinse three times with deionized water;

iv) invert bottles and dry in contaminant-free environment;

v) cap bottles; and

vi) store in contaminant-free area.

ATTACHMENT A2-II

CALIBRATION OF FIELD EQUIPMENT

ATTACHMENT A2-II; ITEM 2
CALIBRATION OF PORTABLE CONDUCTIVITY METER

1. INTRODUCTION

Conductivity is a numerical expression of the ability of an aqueous solution to carry an electric current. This guideline presents a method for checking the calibration of a portable field conductivity meter. The conductivity meter is factory calibrated, however the calibration should be checked on a daily basis prior to use on actual samples on a daily basis.

2. CALIBRATION

The specific conductivity meter must be calibrated prior to use on a daily basis against a standard solution of potassium chloride and deionized water. The probe must be thoroughly rinsed between uses. Calibration of the Cole-Parmer Model DSpH3 specific conductivity meter will be in accordance with the following procedure or following the manufacturers instructions should a different model be used:

a) rinse probe in deionized water;

b) wipe probe and allow to dry;

c) the conductivity displayed should be zero in air;

d) adjust the zero potentiometer if necessary;

e) immerse the probe in a solution of known conductivity;

f) adjust the "SPAN" potentiometer such that the correct conductivity is displayed;

g) rinse probes thoroughly with deionized water and allow to dry; and

h) maintain calibration logs on-Site during working hours and at a secured off-Site location during nonworking hours.

FIELD INSTRUMENT CALIBRATION

Calibration procedures for the field instruments identified below are presented in the following order:

1. pH Meter (Temperature Compensated)
2. Conductivity Meter
3. Turbidity Meter

ATTACHMENT A2-II; ITEM 3
CALIBRATION OF PORTABLE FIELD TURBIDITY METER

1. INTRODUCTION

This procedure presents a method for calibration of the Fisher Scientific Model DRT-15C portable turbidity meter. The turbidity meter is a portable instrument used to provide a direct reading of the cloudiness or clarity of water samples. In order to assure accurate readings, the instrument must be calibrated prior to use in the field each day samples are analyzed for turbidity.

2. CALIBRATION

Calibration will be performed using the following procedure for the Fisher Scientific Model DRT-15C turbidity meter or following the manufacturers procedure should a different model be used:

a) Make sure all glassware and cuvettes are cleaned using deionized water and are free of scratches.

b) Do not operate when battery light indicator is on; a red light indicates that the battery is in need of charge and readings will be invalid.

c) Rotate "RANGE" control to 0-20 range or 0-200 range depending on expected range of samples.

d) Zero calibrate the meter by placing a clean dry cuvette into the cuvette holder and cover with light cell.

e) Adjust reference control so the meter reads zero concentration, proceed tot he next standard.

f) Insert reference standards (10, 50 or 100ppm) and cover with light shield.

g) Adjust reference control so as to read "ACTUAL" reference standard concentrations.

h) Proceed to sample analysis making sure all glassware is cleaned prior to use.

ATTACHMENT A2-II; ITEM 1
CALIBRATION OF PORTABLE pH METER

1. INTRODUCTION

This guideline presents a method for the calibration of a portable pH meter (Model DSpH3). The pH meter measures and provides a log scale reading of the hydrogen ion concentration of a water sample. In order to ensure an accurate reading the pH meter will be calibrated in accordance with the procedures specified below.

2. CALIBRATION

Calibration of the pH meter will be done daily using buffer solutions at pH4 and 10. Buffer solution bottles will have an expiration date. The pH calibration will be temperature compensated. The probe must be thoroughly rinsed between uses. The pH meter should remain powered on after calibration each day until it is no longer required. Should the power be turned off at any point during the day, the instrument must be recalibrated.

Calibration will be performed in accordance with the following procedure for the Cole-Parmer Model DSpH3 meter or following the manufacturers procedure should a different model be used:

a) rinse the probe in deionized water;

b) insert probe in a fresh pH 4 buffer solution;

c) slide battery compartment cover back to the first stop exposing the adjustment potentiometers;

d) adjust the "CAL" potentiometer such that the display reads 4.00;

e) remove the probe and rinse in deionized water;

f) insert probe in a fresh pH10 buffer solution;

g) adjust the slope potentiometer until the correct pH is displayed;

h) remove probe and rinse in deionized water; and

i) maintain pH and temperature calibration logs on-Site at a secured off-Site location during nonworking hours.

B

ATTACHMENT A2-II; ITEM 4
CALIBRATION OF PORTABLE Hnu PHOTOIONIZATION ANALYZER

1. INTRODUCTION

This procedure presents a method for calibration of the Hnu PI101 photoionization analyzer. The Hnu PI101 is a portable instrument used to detect, measure and provide a direct reading of a variety of trace gases in the atmosphere. In order to ensure an accurate reading, the Hnu must be calibrated prior to use in the field on a daily basis.

2. CALIBRATION

The Hnu photoionization will be calibrated in accordance with the following:

a) turn the Hnu unit on to warm up for two to ten minutes;

b) ensure that the probe is attached to the instrument;

c) turn the span dial to "BATT CHECK" to ensure that the battery level is sufficient;

d) turn the span dial to "0-200";

e) open the regulator on the calibration gas cylinder and connect the cylinder to the probe;

f) turn the span dial from "0-200" to "0-20" or "0-2", if required, so as to obtain a readable level;

g) check to ensure that the level read is consistent with that stated for the calibration gas;

h) if calibration is off, use the calibration dial and attempt to recalibrate; and

i) turn the span dial to "stand by" until ready to commence readings.

APPENDIX B

REMEDIAL DESIGN/REMEDIAL ACTION PLAN
HEALTH AND SAFETY PLAN
CEDARTOWN MUNICIPAL LANDFILL SITE
CEDARTOWN, GEORGIA

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ATTACHMENT B-I

TRAINING ACKNOWLEDGMENT FORM

TRAINING ACKNOWLEDGMENT FORM

Please Print:

NAME: _____

ADDRESS: _____

SOCIAL SECURITY NUMBER: _____

EMPLOYER: _____

JOB SITE: _____

I have attended and understood the mandatory Site-specific initiation session for the above-referenced job site. This program referenced the following topics:

i) known potential hazards on Site;

ii) level of personal protection equipment required;

iii) emergency procedures for the Site; and

iv) have received explanation of the basics of the Health and Safety Plan.

I further confirm that I have the required 40 hours of training to comply with 29 CFR 1910.120 and have a respirator for which I have been fit tested.

_____

Signature

B.1.0 INTRODUCTION

The Scope of Work to be completed for the Remedial Design/Remedial Action Plan (RD/RA) for the Cedartown Municipal Landfill Site (Site) in Cedartown, Georgia will include, but may not be limited to, the following activities:

i) installation of bedrock monitoring wells;
ii) decommissioning of selected leachate/groundwater monitoring wells within the Site boundary;
iii) sampling of perimeter bedrock monitoring wells;
iv) sampling of surface water from the Coke Pond; and
v) cover maintenance and seep inspection duties.

The project management plan for this program was presented in Section 7.0 of the RD/RA Work Plan.

This work will involve contact with environmental matrices that may be potentially contaminated with volatile organic compounds and metals. The Site-Health and Safety Plan will be executed for all work performed on Site by Site personnel. A copy of this plan will be maintained on Site at all times and available to all Site employees and visitors. The Site-Specific Health and Safety Plan presented herein has been developed to mitigate the effects presented by the occupational hazards associated with the works to be performed on this Site. This Health and Safety Plan has been designed with the following considerations:

i) that Site personnel are not adversely exposed to occupational chemical, biological or physical hazards;

ii) that compliance standards set forth by governmental and non-governmental agencies (American Conference of Governmental Industrial Hygienists, National Fire Protection Association, etc.) for hazardous waste investigation and remediation activities are met; and

iii) that the public welfare is not endangered, or further environmental degradation take place due to Site investigation activities.

These goals will be achieved by the implementation of a Personal Protective Equipment (PPE) Program and/or engineering controls where applicable. The Health and Safety Plan shall form the basis for development of an Emergency Response Plan for Site emergencies such as personnel injury, fire and explosion. Prior to the commencement of the works, all on-Site personnel shall have read and been verbally instructed in the provisions of the Health and Safety Plan. Those personnel disregarding the Health and Safety Plan will be barred from the Site.

This Site Health and Safety Plan does not regulate the cover maintenance and seep inspection duties which are to be conducted by the City of Cedartown staff. However, it is advised that a copy of this Health and Safety Plan be provided to these personnel and that they be made aware of the potential hazards when working at landfill sites.

B.2.0 SITE CHARACTERIZATION

B.2.1 GENERAL

The Cedartown Municipal Landfill Site is located on the western perimeter of the City of Cedartown, Georgia. Prior to the commencement of landfilling operations, the Site was an iron ore pit mine. The Site received mostly municipal refuse, along with lesser amounts of industrial and small quantity generator waste. The Site was closed in 1979 in accordance with then applicable regulations by capping with a layer of clean soil. The Site is bounded by and lies on property owned by local industries as well as the City. The Site consists of a mixture of developed industrial areas, vegetated and non-vegetated areas. Areas of surface erosion have been noted on Site.

B.2.2 CHEMICAL

The presence and distribution of constituents detected in the various media sampled are described in detail in Section 2.4 of the Work Plan. No significant concentrations of VOCs or BNAs were reported in the off-Site soils while metal concentrations reported in soils are at a or slightly elevated above normal background conditions. Trace concentrations of acetone were reported in wells both upgradient and downgradient from the Site. However, this parameter does not represent a concern at the concentrations reported. No other VOCs or BNAs were reported in the groundwater at significant concentrations. Although elevated metal concentrations were reported in the groundwater, certain metal concentrations may have been impacted by the presence sample sediments or turbidity. This impact will be minimized in the proposed FSAP by utilizing low flow purging and sampling techniques. The surface water sampling location (Coke Pond) contained only one organic (acetone) and four inorganics (calcium, iron, manganese and zinc) in the previous surface water samples. However, this location could potentially be receiving contributions from the East Seep which contains reported concentrations of various VOCs, BNAs and metals. A complete listing of the chemicals reported during

USEPA's investigations along with exposure limits are summarized in Table B.2.1. The PPE and air monitoring programs have been developed based on these exposure limits.

B.2.3 BIOLOGICAL

The biological hazards posed by this Site are divided into two classes: infectious; and poisonous plants and reptiles. Since the Site is a closed municipal landfill, the presence of medical waste cannot be discounted. Food processing waste has been reportedly disposed of at this Site; the presence of high molecular weight fatty acids in water samples obtained from monitoring well CL-05-WP may be indicative of the presence of such waste. Both food processing and medical waste can incubate infectious human pathogens. Poisonous plants which present a dermal contact hazard such as poison ivy, poison oak and poison sumac may be found in the vegetation on the Site. Venomous reptiles, specifically snakes, are widely distributed throughout the Southern United States. They may present a hazard to workers clearing brush or inspecting surface cracks and fissures. Methods of hazard mitigation include proper use of PPE to prevent dermal contact with infectious agents and plant toxins, avoidance of reptile habitat, use of "snake gaiters" when clearing areas of the Site, and adherence to proper Site hygiene.

B.2.4 PHYSICAL

Physical hazards posed by this Site include uneven terrain, overhead electrical lines and temperature. It will be the responsibility of the Site Safety Officer and Project Manager to identify the physical hazards posed by the various Site operations and implement corrective action, including the design of standard operating procedures. The Health and Safety Plan includes a heat stress recognition and mitigation section; cold stress is not anticipated to present a concern at this Site.

B.3.0 BASIS FOR DESIGN

Regulations set forth by the Occupational Safety and Health Administration (OSHA) in Title 29, Code of Federal Regulations, Parts 1910 and 1926 (29 CFR 1900 and 1926) form the basis of this Health and Safety Plan. Emphasis is placed on sections 1910.120 (Hazardous Waste Operations and Emergency Response), 1910 Subpart I (Personal Protective Equipment), and 1910 Subpart Z (Toxic and Hazardous Substances). In addition, current Threshold Limit Values (TLVs) formulated by the ACGIH have been considered in the development of the air monitoring program and the selection of PPE. Some of the specifications within this section are in addition to OSHA regulations, and reflect the positions of the USEPA, the National Institute for Occupational Safety and Health (NIOSH) and the United States Coast Guard (USCG) regarding safe operating procedures at hazardous waste sites.

The health and safety of the public and Site personnel and the protection of the environment will take precedence over cost and schedule considerations for all project work.

B.4.0 ADMINISTRATION

The Principal Contractor will designate an individual who has specific knowledge and training in the area of occupational safety and health for operations at hazardous waste sites, as Site Safety Officer (SSO). This individual will report directly to the Principal Contractor's Industrial Hygienist and/or Project Manager.

B.4.1 RESPONSIBILITIES OF THE SITE SAFETY OFFICER

The SSO will supervise the implementation of the Health and Safety Plan and will be responsible for all decisions regarding operations and work stoppage due to health and safety considerations.

The responsibilities of the SSO are as follows:

i) be responsible for implementation of the Health and Safety Plan at the initiation of Site work; and

ii) conduct the initial briefing sessions for all on-Site personnel with regard to this Health and Safety Plan and other safety requirements to be observed during field sampling, including:
   a) potential hazards;
   b) personal hygiene principles;
   c) personnel protective equipment when necessary;
   d) respiratory protection equipment usage when necessary; and
   e) emergency procedures dealing with fire and medical situations;

iii) review and modify the Site Health and Safety Plan as more information becomes available concerning the hazardous materials involved and review all monitoring reports;

iv) supervision and enforcement of safety equipment usage;

v) supervision and inspection of equipment cleaning;

vi) conduct air monitoring program;

vii) personnel training in safety equipment usage and emergency procedures;

viii) monitoring of safety and health program under direction of an industrial hygienist;

ix) suspend work activity if unsafe working conditions develop;

x) inform workers of the nature of chemical exposure risk as required by the OSHA Right-to-Know Law;

xi) recommend medical examination when worker appears to require it; and

xii) coordination of emergency procedures.

B.4.2 MEDICAL SURVEILLANCE AND TRAINING

B.4.2.1 Medical Surveillance

Prior to commencement of on-Site activities, all personnel engaged in operations that may involve direct contact with potentially contaminated materials shall provide evidence of medical surveillance as specified in 29 CFR 1910.120 and 29 CFR 1910.134. This program shall be valid for the current employment year and updated as necessary. Prior to the medical examination, the attending physician will be supplied with a copy of 29 CFR 1910.120, including all appendices, a description of the employee's Site duties, anticipated exposure levels, a description of PPE to be used, including the fact that the employee may be required to wear respiratory protection.

Medical records for all on-Site personnel shall be maintained by their respective employers. These records will detail the testing performed, results and include a statement by the attending physician as to the fitness of the employee to perform assigned Site tasks. These records shall be available to the employee or designated representative as specified under the provisions of 29 CFR 1910.120 Section (f). In addition, all subcontractors so required, will provide evidence of employee inclusion in a surveillance program to CRA. Personnel not providing such evidence will not be allowed to perform work in areas where contaminants may be present.

Interim medical surveillance will be performed if an individual exhibits symptoms of adverse exposure to Site contaminants, suffers an occupational injury related to Site activities, or is exposed to elevated levels of contaminants due to an accidental release, even though there are no immediate symptoms. A tetanus booster shot will be required for all employees working on Site, if determined necessary, unless waived by the examining physician.

B.4.2.2 Training

As the Principal Contractor, CRA shall require that all Site personnel whose on-Site job tasks may directly expose them to potentially contaminated material complete training as specified in 29 CFR 1910.120. This training shall include yearly refresher courses, if required. In addition, those personnel serving in a supervisory capacity shall have completed an additional supervisor's course. If so required, all subcontractors shall provide evidence of appropriate training for each of their employees working on Site. The City of Cedartown staff conducting the cover maintenance and seep inspection duties are exempt from this requirement.

Prior to commencement of Site activities, an initiation session will be conducted for all on-Site personnel. This will include: a description of the work to be performed; the known contaminants that may be encountered, types of PPE to be used; the industrial hygiene monitoring program to be employed; any unique Site hazards that may be encountered; emergency procedures; and, contaminant control protocols. Each person

working on the Site will be provided with a copy of this Health and Safety Plan. All personnel attending this session will be required sign a Training Acknowledgment Form as provided in Attachment B-II.

The SSO will conduct additional Safety Meetings on a periodic basis. These Safety Meetings will address topics related to the safe conduct of various job tasks, the results of industrial hygiene monitoring, any changes to the Health and Safety Plan and pertinent topics of concern. The SSO will be responsible for maintaining records of topics discussed and personnel in attendance.

B.4.2.3 Confidentiality of Records

Documentation of medical surveillance and training will be maintained in files accessible only to the SSO and Industrial Hygienist. Records shall be made available to agency personnel for inspection by written request only. Site personnel shall be permitted access to their records upon request.

B.5.0 PERSONAL PROTECTIVE EQUIPMENT (PPE) PROGRAM

The Personal Protective Equipment (PPE) Program will be implemented based upon the nature of the work to be performed and the area that job tasks are to be performed in. A Site hazard analysis table is provided in Table B.2. Work areas are defined by the nature of the task to be performed and are presented in Section B.7.

B.5.1 RESPIRATORY PROTECTION

Previous investigations conducted at this Site indicate that potential pulmonary hazards may include particulate bound chemicals and volatile organic compounds. The respiratory protection program presented herein has been developed based on this characterization.

Prior to arriving at the Site, all on-Site personnel will have received training in the use of, and have been fit tested for, either half- or full-facepiece respirators.

A miniram direct reading particulate monitor will be used to determine if particulate bound chemicals are becoming airborne in significant concentrations.

Action levels of airborne particulates to determine the level of respiratory protection necessary during field activities are as follows:

Sustained Airborne	*Protection Level*
<5 mg/m^3	Level D
>5 mg/m^3	Level C
>50 mg/m^3	Cease operations and move to safe area. Confer with HSO. Re-evaluate work plan. Abandon location or upgrade to Level B and continue.

A Photoionization Detector (PID) will be used to determine if organic vapors and some inorganic gases are present during drilling activities. A background reading will be established prior to commencing drilling activities at each location.

Action levels of organic vapor monitoring to determine the level of respiratory protection necessary during field activities will be:

Sustained Photoionization Organic Vapor Reading Above Background	***Protection Level***
≤ Background	Level D
<5 meter units above background	Level C
≥5 meter units above background	Cease operations and move to a safe area. Confer with HSO. Re-evaluate work plan. Abandon location or upgrade to Level B and continue.

Work will be stopped and the work area will be allowed to vent if monitoring indicates that any of the following conditions exist:

i) toxic gases and particulates are present at concentrations which present Immediate Danger to Life and Health (IDLH) conditions, or in excess of the protection factor afforded by the air purifying respirator (whichever is lower); or

ii) the oxygen content of the air is less than 19.5 percent.

B.5.2 DERMAL CONTACT PROTECTION

The dermal contact hazards presented by this Site have three sources: chemicals solubilized in groundwater; chemicals bound to soil particles; and, waste materials. The PPE selected for this Site was chosen to mitigate these hazards.

CRA will require that all on-Site personnel are equipped with PPE appropriate for the nature of work being completed. CRA will require that all safety equipment and protective clothing are kept clean, well-maintained and that their integrity is intact.

Safety equipment and apparel as required for all site activities will be Level D unless airborne particulate monitoring or organic vapor monitoring indicates the need to upgrade to Level C.

The Level D protective equipment consists of the following:

i) work boots with steel toe and shank;
ii) hard hat;
iii) latex and/or cotton gloves; and
iv) safety glasses and/or goggles.

Level C protective equipment which will be used on Site should it be found necessary consists of the following:

i) individually assigned half or full-facepiece air-purifying respirators (NIOSH approved), with appropriate cartridges for organic vapors and particulates. Respirators should be available at all times and donned when required as indicated by air monitoring;

ii) chemical-resistant disposable coveralls;

iii) latex and/or cotton inner gloves;

iv) nitrile outer gloves;

v) work boots with steel toe and shank;

vi) chemical-resistant overboots or booties;

vii) hard hat; and

viii) safety glasses and/or chemical-resistant goggles.

If work is conducted beyond the Site boundary, it is anticipated that only boots and gloves will be required.

Additional protective equipment usage guidelines to be implemented include:

i) prescription eyeglasses in use on the Site will be safety glasses;

ii) contact lenses will not be permitted in the Exclusion Zone;

iii) all disposable or reusable nitrile, latex and/or cotton gloves worn on the Site will be changed, decontaminated or discarded at the end of each day;

iv) during periods of respirator usage, respirator cartridges and filters will be changed daily, or upon breakthrough, whichever occurs first;

v) on-Site personnel who have not passed a respirator fit test will not be permitted to enter or work in the Exclusion Zone. Personnel will not be permitted to have beards, or long sideburns or mustaches as these interfere with a proper fit of the respirator;

vi) all PPE worn on Site will be decontaminated or discarded at the end of each work day;

vii) duct tape will be used to ensure that disposable coveralls and gloves are tightly secured when personnel are working within the Exclusion Zone; and

vii) no watches, rings or other accessories will be permitted during drilling and sampling activities.

B.5.3 FIT TESTING

Fit testing of the respirator will be conducted by an IH or other designated, trained personnel following the medical evaluation. All users of respirators must be fit tested to assure proper protection. Only the brand and size a person is fitted for is allowed to be used in the field. The fit test will be accomplished by the use of irritant smoke (stannic chloride aerosol), Isoamyl Acetate using a standardized testing protocol or quantitatively. Records will be maintained by the Corporate IH with copies available in CRA field offices for audit purposes. After fit testing, the employee will be issued an authorization card. This card serves as a reference for the proper type of respirator to use as well as prima facie proof of proper medical and training clearance for regulatory purposes.

B.6.0 AIR MONITORING

B.6.1 PROTOCOLS

During the progress of active drilling, air quality on Site will be monitored. Monitoring will be conducted on a regular periodic basis and additionally as required by special or work-related conditions. The daily monitoring program will consist of monitoring with a photoionization device (PID), calibrated daily for volatile organic vapors and a combustible gas meter for drilling applications. An airborne particulate monitor will be used to monitor for airborne dust levels. The ionization potential of the PID shall not be less than 11.0 ev. A daily record of all air monitoring results, along with instrument calibration and maintenance shall be kept in a permanently bound logbook; the SSO shall acknowledge (by signature) and date all entries.

A flame ionization detector (FID) will be made available for air monitoring should conditions warrant.

The instrument used will be calibrated and maintained in accordance with the manufacturer's protocols, with the option of establishing response factors to Site specific compounds at the discretion of the SSO.

Readings will be obtained hourly in the breathing zone of personnel engaged in drilling work. All measurements will be corrected for upwind background influences. At the discretion of the SSO, the perimeter reading frequency may be reduced if no significant elevation of levels is detected immediately downwind of active operations.

During the conduct of operations, the following action levels will be employed:

Sustained Organic Vapor Reading in Breathing Zone	*Protection Level*
On-Site:	
• ≤Background	Level D
• <5 ppm	Full-face APR
• >5 ppm	Suspend work, allow area to vent.

Sustained Airborne Particulate Reading	*Protection Level*
• <5 mg/m^3	Level D
• >5 mg/m^3	Level C
• >50 mg/m^3	Cease operations and move to safe area, confer with HSO. Re-evaluate work plan. Abandon location or upgrade to Level B and continue.

Immediately upon identifying elevated levels of volatile vapors (greater than 5 parts per million) or elevated airborne particulate levels in the breathing zone or a low explosive limit (LEL) of 10 percent results shall be reported to the HSO, who will determine when PPE should be upgraded or operations be shut down and restarted.

At the discretion of the SSO, or the Industrial Hygienist, personal monitoring using NIOSH analytical methodology may be conducted to confirm the effectiveness and appropriateness of the PPE Program. The Health and Safety Plan and specified levels of protection may be modified by the Industrial Hygienist based on the additional Site data obtained.

B.6.2 ADDITIONAL AIR MONITORING

Monitoring will be conducted periodically for the presence of explosive vapors, oxygen and hydrogen sulfide during all drilling activities. Monitoring for explosive vapors and hydrogen sulfide will be conducted using direct reading instruments calibrated according to

manufacturer's protocols; the calibration as well as reading results shall be recorded in the logbook with the organic vapor measurements. These readings will be obtained directly over the borehole on an hourly basis or more frequently as directed by the SSO. Oxygen readings will be obtained on a periodic basis with a direct reading instrument calibrated in accordance with manufacturer's protocols; records will be kept as above. During the conduct of operations, the following action levels will be employed:

Analyte	*Reading*	*Action Taken*
Explosive Vapors	20% LEL	Suspend work, allow area to vent.
Hydrogen Sulfide	>10 ppm	Suspend work, allow area to vent.
Oxygen	<19.5%	Evacuate area to area of higher oxygen concentration.

B.7.0 WORK AREAS

Specific work areas will be delineated by fence or a flagged line as outlined below:

i) Exclusion Zone (EZ) - This zone will include all areas where potentially contaminated soils or materials are to be excavated, handled, spoiled or covered, and all areas where contaminated equipment or personnel travel. When groundwater sampling is being conducted, or monitoring wells are being constructed or decommissioned the EZ will encompass a circle 20 feet in diameter around the monitoring well. Due to the nature of the Site activities, the EZ at each location will be temporarily enforced until the completion of each task.

Prior to commencing operations, the EZ will be clearly delineated in the field by warning tape with warning signs spaced around the perimeter of the Zone warning of a hazardous work area. For groundwater monitoring and sampling the EZ will be enforced by the Site personnel conducting the activities.

ii) Contaminant Reduction Zone (CRZ) - This zone will occur at the interface of the EZ and Support Zone and will provide access for the transfer of construction materials and Site dedicated equipment to the EZ, the decontamination of transport vehicles handling contaminated soil prior to leaving the EZ, the decontamination of personnel and clothing prior to entering the Support Zone and for the physical segregation of the Support Zone and EZ. A typical decontamination pad is illustrated in Figure B.1.

iii) Support Zone (SZ) - This area is the portion of the Site defined as the area outside the zone of significant air and soil contamination. The Support Zone will be clearly delineated and procedures implemented to prevent active or passive migration of contamination from the work Site. The function of the Support Zone includes:

a) an entry area for personnel, material and equipment to the CRZ;
b) an exit area for decontaminated personnel, materials and equipment from the EZ;
c) the housing of Site special services; and
d) a storage area for clean safety and work equipment.

B.8.0 PERSONAL HYGIENE

The SSO will require that all personnel performing or supervising work within the Exclusion Zone observe and adhere to the personal hygiene-related provisions of this section.

On-Site personnel found to be disregarding the personal hygiene-related provisions of this Health and Safety Plan will be barred from the Site.

The following equipment/facilities will be provided for the personal hygiene of all on-Site personnel:

i) suitable disposable outerwear, gloves, respiratory protection and footwear on a daily basis for the use of on-Site personnel;
ii) disposal containers for used disposable outerwear; and
iii) potable water and a suitable sanitation facility.

The following personal hygiene protocols shall be strictly adhered to by all personnel:

i) on-Site personnel will wear appropriate PPE when in the Exclusion Zone;

ii) used disposable outerwear will not be reused if deemed to be unsuitable to provide the necessary protection, and when removed, will be placed inside disposal containers provided for that purpose;

iii) smoking, eating and drinking will be prohibited within the Exclusion Zone; and

iv) on-Site personnel will thoroughly cleanse their hands, face, neck area and other exposed areas before smoking, eating or drinking and before leaving the Site.

LEVEL C - ROUTINE DECONTAMINATION

Step 1 - Equipment Drop

- Deposit equipment used on site (tools, sampling devices, monitoring equipment, radios, etc.) on plastic drop cloths.
- Decontaminate or dispose of items before removal from Exclusion Zone.

Step 2 - Outer Boot/Glove Wash and Rinse

- Scrub outer boots/gloves and/or splash suit with decontamination solution
- Rinse using water.

Step 3 - Outer Boot/Glove Removal

- Remove outer boots/gloves.
- If outer boots/gloves are disposable, deposit in container with plastic liner.
- If outer boots/gloves are non-disposable, store in a clean, dry place.

Step 4 - Outer Garment Removal

- Remove chemical protective outer garments and deposit in appropriate container.

Step 5 - Respiratory Protection Removal

- Remove hard hat and respirator and deposit on a clean surface.
- Discard respirator cartridges in appropriate container.
- Wash and rinse respirator.
- Wipe off and store respirator in a clean, dry location.

Step 6 - Inner Glove Removal

- Remove inner gloves.
- Deposit in container for disposal.

Step 7 - Field Wash

- Thoroughly wash hands and face with soap and water.
- Shower as soon as possible.

For Cartridge Exchange Only

Step 1 - Equipment Drop

- Deposit equipment used on site (tools, sampling devices, monitoring equipment, radios, etc.) on plastic drop cloths.
- Decontaminate or dispose of items before removal from Exclusion Zone.

Step 2 - Glove Wash and Rinse

- Scrub gloves and/or splash suit with decontamination solution.
- Rinse using water.

Step 3 - Glove Removal

- Remove gloves.
- If gloves are disposable, deposit in container with plastic liner.
- If gloves are non-disposable, store in a clean, dry place.

Step 4 - Respirator Cartridge Change

- Exchange respirator cartridges.
- Don new outer boots/gloves.
- Tape joints and return to exclusion zone.

LEVEL D - MODIFIED ROUTINE DECONTAMINATION

Step 1 - Equipment Drop

- Deposit equipment used on site (tools, sampling devices, monitoring equipment, radios, etc.) on plastic drop cloths.
- Decontaminate or dispose of items before removal from exclusion zone.

Step 2 - Outer Boot/Glove Wash and Rinse

(Optional, include if necessary for gross decontamination).

- Scrub outer boots/gloves and/or splash suit with decontamination solution.
- Rinse using water.

Step 3 - Outer Boot/Glove Removal

- Remove outer boots/gloves.
- If outer boots/gloves are disposable, deposit in container with plastic liner.
- If outer boots/gloves are non-disposable, store in a clean, dry place.

Step 4 - Outer Garment Removal

- Remove chemical protective outer garments and deposit in an appropriate container.
- Remove hard hat and safety glasses. Decontaminate as necessary. Deposit on a clean surface.

Step 5 - Inner Glove Removal

- Remove inner gloves.
- Deposit in a container for disposal.

Step 6 - Field Wash

- Thoroughly wash hands and face with soap and water.
- Shower as soon as possible.

B.9.0 ENVIRONMENTAL STRESS

B.9.1 HEAT STRESS

It is anticipated that heat stress will be the predominating environmental factor while working on this Site. The effects of heat stress on an unacclimatized individual can be severe. The best indication that an employee is suffering from the effects of heat stress is that individual's recognition of the onset of symptoms. Prior to the initiation of on-Site work, all employees will be trained prior to beginning work by the Health and Safety Officer in the following:

1) individual factors which influence an individual's susceptibility to heat;
2) environmental characteristics such as temperature, humidity, wind speed, and cloud cover;
3) body response to heat;
4) effect of personal protective equipment and workload;
5) the various types of heat disorders and their associated symptoms; and
6) heat stress program - acclimatization, monitoring, work/rest regiment, and fluid intake (balanced electrolytic fluids).

This training will be conducted at the time of the initial training.

The symptoms of heat stress include panting, increased sweating, rapid pulse, fatigue, lightheadedness, nausea, headache, cramps and fainting. If worker feels the onset of any of these symptoms, they will be encouraged to take the following actions: leave the work area; remove all PPE in the designated area; and, rest, preferably in a shady, breezy area outside the Exclusion Zone. That person will also be encouraged to drink plenty of cool (not ice cold) water and perform light work until the symptoms subside; the SSO will also be informed. All workers will be encouraged to increase their fluid intake both at work and away from the Site, decrease alcohol consumption, slightly increase salt intake and obtain adequate rest.

In the event that Level C PPE is required during field activities, monitoring for heat stress will commence when the ambient air temperature is above 70°F. If ambient temperatures remain above 70°F, then monitoring will continue for every day that the ambient temperature exceeds 70°F. Heat stress monitoring will also commence if individuals exhibit the signs and symptoms of heat stress. Heat stress monitoring will consist of a daily log of body weight loss. Total body weight will be recorded four times daily, at a minimum when the heat stress monitoring is in effect. This log will be maintained for each Site employee for the duration of the project. In addition, the Health and Safety Officer will also monitor Site personnel health.

After each worker has become familiar with his own limitations, and as long as the daily activities are not noticeably altered, it will remain the responsibility of the worker to remain cognizant of his own physical condition. Each individual will be made aware of the effects of acclimatization and that the loss of some acclimatization after a few days of rest will occur.

In addition to individual recognition of heat stress symptoms, work tasks may be scheduled to allow for proper acclimatization. Should an individual exhibit a lag in acclimatization, the SSO may recommend that the individual be assigned less stressful tasks, until full acclimatization has been achieved. Also, as air temperature increases, the SSO will recommend that more frequent or longer breaks be taken as workers require. Workers will be advised that acclimatization can be lost over a layoff period of longer than four days, and that after an extended layoff, that the work schedule be modified to account for reacclimatization. Daily work schedules may be adjusted to take advantage of local climatic conditions.

B.10.0 COMMUNICATIONS

A telephone will be available on Site and emergency numbers including police, fire, ambulance, hospital and appropriate regulatory agencies will be prominently posted near the phone.

In addition, if required, two-way radios will be employed to allow for communication between work sites and base.

B.11.0 BUDDY SYSTEM

No individual will be permitted to work on Site alone. At least two people must be on Site at all times, if work involving contact with potentially contaminated materials is performed. If these workers do not maintain line of sight contact, then two-way radios will be employed to maintain voice communication between personnel. The SSO will be responsible for insuring that all personnel have left the Site and are accounted for at the end of each work day.

A permanent record will be kept of the personnel working or visiting the Site. This will include person's name, date, company or agency that person represents, time of arrival and time of departure. In addition, the SSO will maintain a list of those people who possess the proper certification and training to perform work in the Exclusion Zone. Unauthorized personnel will be requested to leave the Site.

B.12.0 EMERGENCY AND FIRST AID EQUIPMENT

Safety equipment will be located on Site in a centralized location as directed by the SSO. This equipment will include:

i) portable emergency eyewash, located at the Work Site;
ii) two 20 pound type ABC dry chemical fire extinguishers;
iii) OSHA approved first-aid kit, with snakebite kit and insect repellent;
iv) two flashlights in working order; and
v) bullhorn or other loud emergency signaling device.

In addition, at least one person on Site will possess current training in emergency first-aid and CPR.

B.13.0 EMERGENCY RESPONSE PLAN

Prior to commencing drilling work, the Principal Contractor will coordinate the development of an emergency contingency plan. The plan is intended to provide immediate response to a serious Site occurrence such as an injury, explosion or fire. At that time, a list of appropriate emergency contracts and their respective phone numbers will be developed.

A meeting with local emergency response agencies (i.e., police, fire, Emergency Medical Technicians) will be conducted to inform them of the nature of work to be performed, any special problems which may be encountered during an emergency response and to introduce them to the SSO and project management.

In the event of injury to on-Site personnel, the following protocol will be followed:

i) notify the SSO and USEPA's on-Site representative;

ii) contact the designated hospital and describe the injury;

iii) decontaminate personnel if possible, and administer appropriate first aid. If personnel cannot be decontaminated, alert hospital to possible problems of contamination; and

iv) transport personnel to the medical facility along a predefined route, as illustrated on Figure B.2. This map will be posted next to the phone list of emergency contacts.

B.14.0 EQUIPMENT AND PERSONNEL DECONTAMINATION

During the initiation of field activities, procedures will be implemented to minimize the amount of contact between personnel and equipment with the waste constituents. These procedures include the following:

i) proper work practices which minimize direct contact with potentially contaminated material; and
ii) use of disposable equipment and clothing as much as practicable.

All equipment leaving the Exclusion Zone will enter a designated decontamination area(s) and those parts of the equipment which came in contact with potentially contaminated material will be decontaminated.

Personnel decontamination will take place at the border of the Exclusion Zone and Contaminant Reduction Zone. Decontamination consists of boot and glove wash with detergent, tape removal, outer glove removal, removal of boots, gloves, disposable suit, respirator, hard hat and inner gloves.

All personnel will remove their protective clothing and wash their hands and face before entering the lunch and break areas to eat, drink or smoke.

As much as is practical, equipment will be protected with polyethylene or other coverings to prevent it from becoming contaminated. If this is not practical, then as much of the potentially contaminated material as possible will be removed from the equipment before it is moved from the work site to the decontamination area. Decontamination procedures shall at a minimum, consist of a thorough wash with high pressure hot water to remove all visible traces of dirt and grime. Dermal contact PPE will be worn during equipment decontamination, with either a face shield of full-face respirator, at the direction of the SSO.

B.15.0 CONTAMINATION MIGRATION CONTROL

All vehicles and equipment used within the Exclusion Zone will be decontaminated on Site at the equipment decontamination area as determined necessary by the SSO and/or Project Manager prior to leaving the Site. Decontamination, when required, will consist of the thorough cleaning of those parts of the equipment which come in contact with potentially contaminated material. The SSO, Project Manager and/or designated representative will certify that each piece of equipment is clean or has been decontaminated prior to removal from Site.

B.16.0 WASTE MATERIAL HANDLING

All potentially contaminated materials generated during Site operations will be stored, stockpiled or containerized in approved containers pending receipt of analytical results. The analytical results will be used to determine the appropriate disposition of the collected materials. Used disposable PPE will be collected in a drum lined with a heavy gauge polyethylene drum liner; the drum liner will be tightly sealed prior to removal from the drum. The drum liner and PPE will then be disposed of on Site or at an appropriate facility as determined by analytical results. All decontamination fluids will be collected and containerized on Site. The collected waters will be sampled and ultimately disposed in accordance with applicable regulations.

B.17.0 ADDITIONAL PRACTICES TO BE OBSERVED

In addition to the above, all pertinent sections of 29 CFR 1910 and 1926 shall be observed during the conduct of all on-Site activities. These may include, but are not limited to:

i) all flammable solvents used on Site will be stored in an approved safety can;
ii) no smoking or open flame will be allowed in the vicinity of flammable solvents;
iii) "hot fueling" of equipment will be prohibited. All equipment will be shut down and allowed to cool prior to refueling;
iv) portable electric generators used on Site will be equipped with ground fault interrupters;
v) all machinery guards will be in place, and in good repair; and
vi) sanitation and portable lighting used on Site shall meet the requirements of 29 CFR 1910.120.

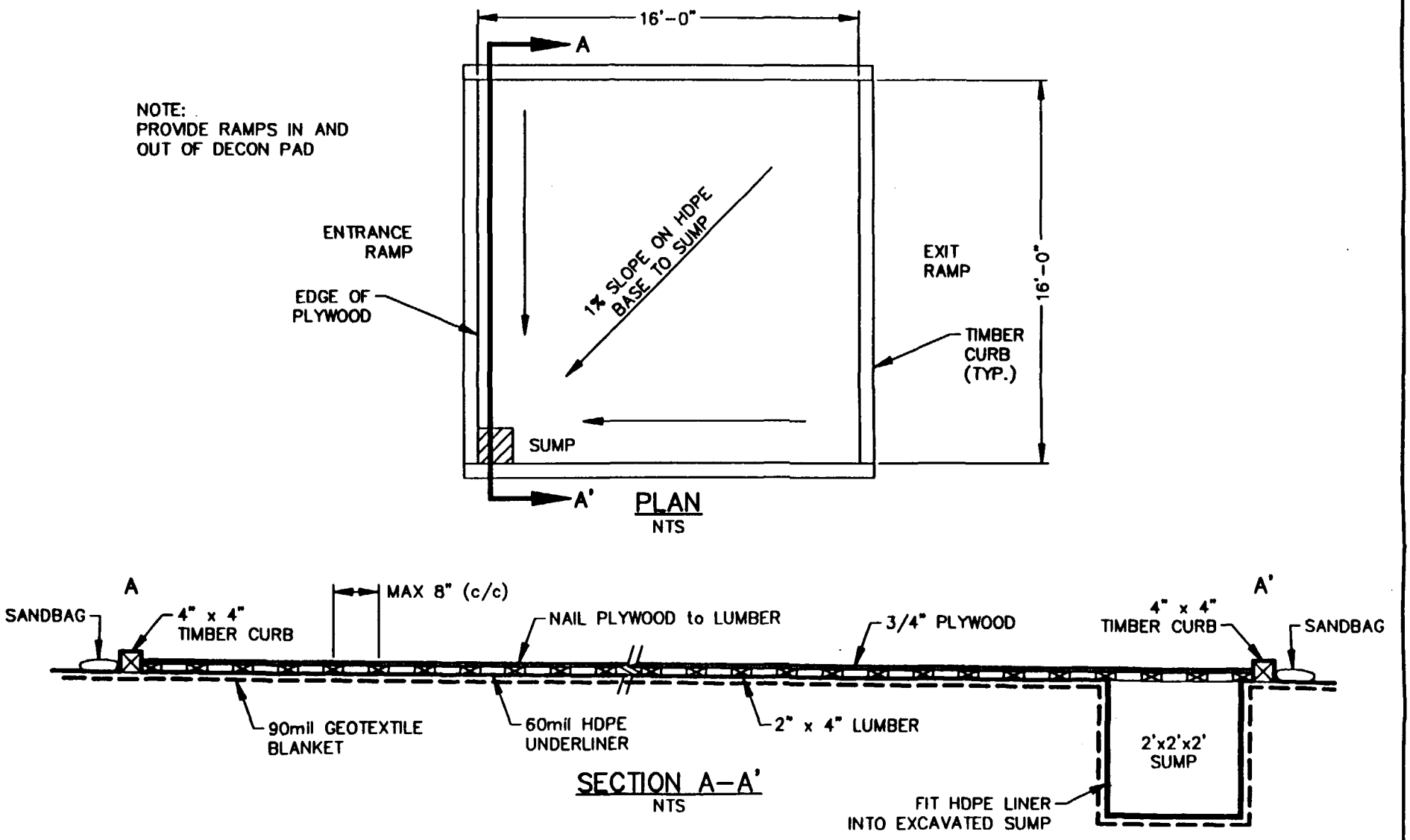

figure B.1

TYPICAL DECONTAMINATION PAD
CEDARTOWN MUNICIPAL LANDFILL SITE
Cedartown, Georgia

CRA

3482 (9) JUNE 25/94(W) REV.0 (D-02)

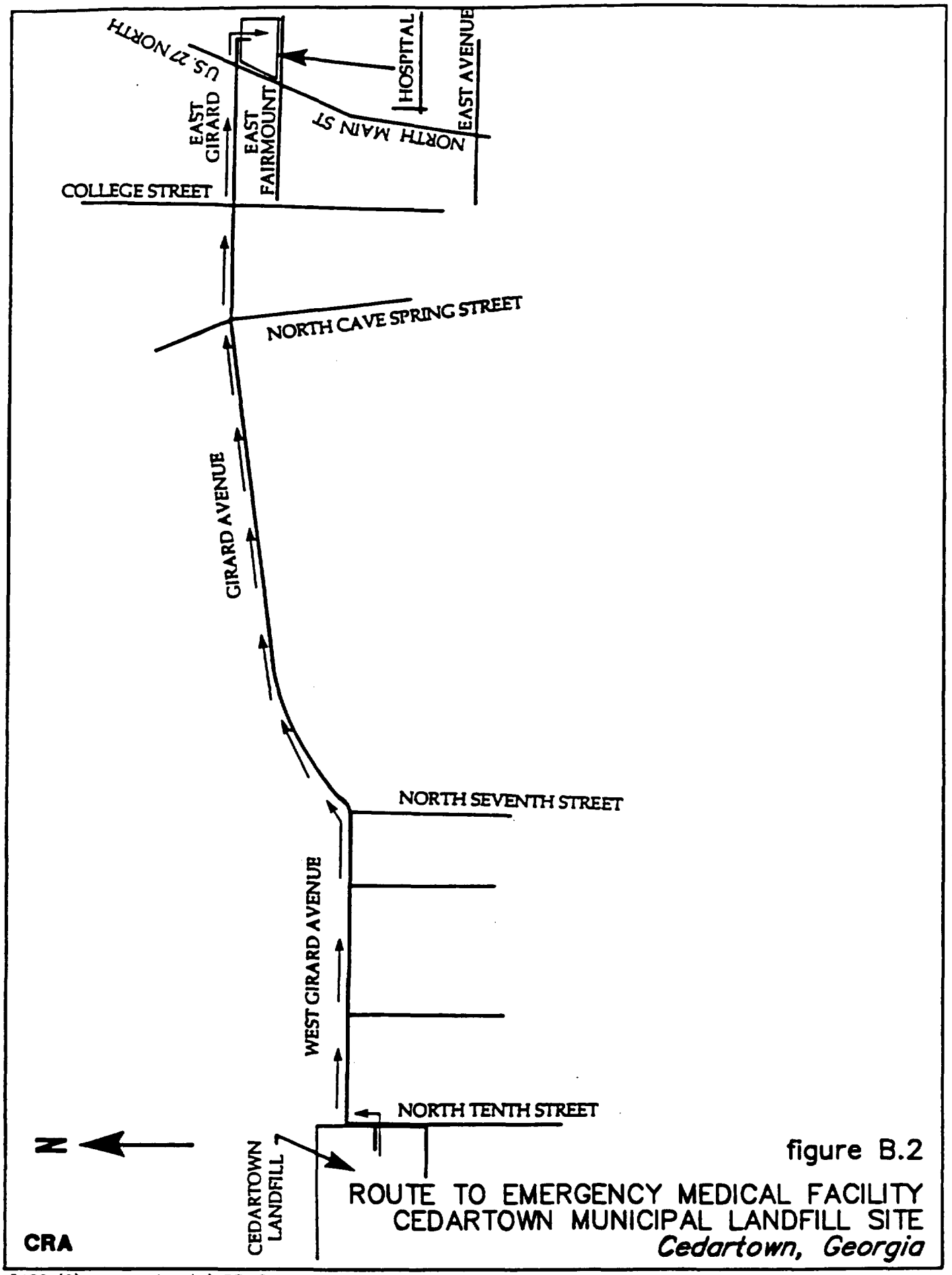

figure B.2

ROUTE TO EMERGENCY MEDICAL FACILITY
CEDARTOWN MUNICIPAL LANDFILL SITE
Cedartown, Georgia

3482 (9) JUN 24/94 (W) REV.0

TABLE B.1

SUMMARY OF TOXICOLOGY AND CHEMICAL CONSTANTS
CEDARTOWN MUNICIPAL LANDFILL SITE
CEDARTOWN, GEORGIA

CHEMICAL	MOL.WT. (1)	VAPOUR PRESSURE @ mmHg/30 C (1)	SOLUBILITY @ 30 C mg/L (1)	log Kow (1)	Koc (2)	BCF L/kg (2)	ORAL CSF 1/[mg/kg-day] (3)	ORAL RfD mg/kg-day (3)	INHALATION CSF 1/[mg/kg-day] (3)	INHALATION RfD mg/kg-day (3)	PRIMARY TARGET ORGAN (3)
VOCs											
ACETONE	58.1	270	Miscible	- 0.24	2.2	--	--	0.1	--	--	liver and kidney
BENZENE	78.1	118	1791	2.13	83	5.2	0.029	--	0.029	--	blood
BUTANONE, 2-	72.1	100	239000	0.29	4.5	0	--	0.05	--	0.286	
CARBON DISULFIDE	76.1	430	1700	1.84	54	0	--	0.1	--	0.0029	fetus
CHLOROBENZENE	112.6	15	488	2.83	330	10	--	0.02	--	0.006	liver
DICHLOROETHANE, 1,2-	99.0	100	9000	1.48	14	1.2	0.091	--	0.091	--	
ETHYLBENZENE	106.2	12	174	3.15	1100	37.5	--	0.1	--	0.286	liver and kidney
METHYLENE CHLORIDE	84.9	511	16700	1.25	--	--	0.0075	0.06	0.014	0.857	
PHENOL	94.1	0.35	67000	1.48	14.2	1.4	--	0.6	--	0.02	fetus
TOLUENE	92.1	36.7	554	2.69	300	10.7	--	0.2	--	0.57	liver and kidney
XYLENES	106.2	10	200	3.18	240	--	--	2	--	0.086	decreased weight
BNAs											
ACENAPHTHENE	154.2	1.55E-03	3.5	4.3	4600	242	--	0.06	--	--	
ANTHRACENE	178.2	1.95E-04	0.073	4.45	14000	--	--	0.3	--	--	
BENZO[A]ANTHRACENE	228	2.20E-08	0.006	5.6	1380000	--	7.3	--	--	--	
BENZOIC ACID	122.1	4.50E-03	3400	1.87	182	--	--	4	--	--	
DIBENZOFURAN	168.2	--	10	4.17	10000	--	--	--	--	--	
DI-n-BUTYL PHTHALATE	278.4	1.40E-05	13	5.6	170000	--	--	0.1	--	--	
DICHLOROBENZENE	147	1.9	156	3.6	1700	56	--	0.09	--	0.057	
DIMETHYL PHENOL, 2,4-	122.2	9.80E-02	7868	2.5	118	--	--	0.02	--	--	
FLUORENE	166.2	7.10E-04	1.69	4.2	7300	1300	--	0.04	--	--	
METHYLPHENOL, 4-	108.1	1.08E-01	23000	1.94	49	--	--	0.05	--	--	
NAPHTHALENE	128.18	0.23	30	3.3	1368	--	--	--	--	--	weight gain
NAPHTHALENE, 2-METHYL-	142.2	--	25	--	7943	--	--	--	--	--	
NITROSODIPHENYLAMINE, N-	198.2	--	35.1	3.13	575	--	0.0049	--	--	--	
PHENANTHRENE	178.22	6.80E-04	0.816	4.46	14000	2630	--	--	--	--	
PHTHALATE, BIS(2-ETHYLHEXYL)	390.57	6.45E-06	0.35	5.11	4400000	--	0.014	0.02	--	--	liver
PHTHALATE, DIETHYL-	222.2	1.65E-03	1080	2.47	142	117	--	0.8	--	--	decreased growth
PYRENE	202.3	6.90E-07	0.171	4.88	38000	--	--	0.03	--	--	
METALS											
ALUMINUM	26.98	0.00	--	--	--	--	--	--	--	--	
ANTIMONY	122	0.00	--	--	--	--	--	0.0004	--	--	
ARSENIC	75	0.00	--	--	--	44	1.75	0.0003	15	--	respiratory system
BARIUM	137	0.00	--	--	--	--	--	0.07	--	1.40E-04	cardiovascular system
BERYLLIUM	9	0.00	--	--	--	19	4.3	0.005	8400	--	lung
CADMIUM	112.14	0.00	insoluble	--	--	81	--	0.001 (food)	6.3	--	respiratory tract
CALCIUM	40	0.00	--	--	--	--	--	--	--	--	
CHROMIUM*	52	0.00	--	--	--	--	--	0.005	42	--	

TABLE B.1

SUMMARY OF TOXICOLOGY AND CHEMICAL CONSTANTS
CEDARTOWN MUNICIPAL LANDFILL SITE
CEDARTOWN, GEORGIA

CHEMICAL	MOL.WT. (1)	VAPOUR PRESSURE @ mmHg/30 C (1)	SOLUBILITY @ 30 C mg/L (1)	log Kow (1)	Koc (2)	BCF L/kg (2)	ORAL CSF 1/[mg/kg-day] (3)	ORAL RfD mg/kg-day (3)	INHALATION CSF 1/[mg/kg-day] (3)	INHALATION RfD mg/kg-day (3)	PRIMARY TARGET ORGAN (3)
METALS											
COPPER	64	0.00	--	--	--	200	--	0.037	--	0.01	gastrointestinal system
IRON	55.8	0.00	--	--	--	--	--	--	--	--	
LEAD	207	0.00	--	--	--	49	--	0.0014	--	4.30E-04	
MANGANESE	55	0.00	--	--	--	--	--	0.1	--	1.14E+00	
								0.14(Food)/0.005(Water) (4)			
MERCURY	201	0.00	--	--	--	--	--	0.0003	--	8.60E-05	
NICKEL	59	0.00	--	--	--	47	--	0.02	0.84	--	
POTASSIUM	39	0.00	--	--	--	--	--	--	--	--	
SELENIUM	79	0.00	--	--	--	16	--	0.005	--	--	
SILVER	108	0.00	--	--	--	--	--	0.005	--	--	
SODIUM	23	0.00	--	--	--	--	--	--	--	--	
THALLIUM	204.4	0.00	--	--	--	--	--	0.00007	--	--	
VANADIUM	51	0.00	--	--	--	--	--	0.007	--	--	
ZINC	65	0.00	--	--	--	47	--	0.3	--	0.01	
CYANIDE		0.00	--	--	--	--	--	0.02	--	--	

REFERENCES:

- TOXICITY VALUES ARE FOR CHROMIUM VI

(1) "HANDBOOK AND ENVIRONMENTAL FATE AND EXPOSURE DATA FOR ORGANIC CHEMICALS"
VOLUME I: LARGE PRODUCTION AND PRIORITY POLLUTANTS, AND
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GROUNDWATER CHEMICALS DESK REFERENCE, JOHN H. MONTGOMERY AND LINDA M. WELKOM, LEWIS PUBLISHERS, 1990.

(2) USEPA "SUPERFUND PUBLIC HEALTH EVALUATION MANUAL", EPA/540/1-86/060, OCTOBER 1986.

GROUNDWATER CHEMICALS DESK REFERENCE, JOHN H. MONTGOMERY AND LINDA M. WELKOM, LEWIS PUBLISHERS, 1990.

(3) USEPA INTEGRATED RISK INFORMATION SYSTEM (IRIS), JULY 1992.
USEPA HEALTH EFFECTS ASSESSMENT SUMMARY TABLES, OERR 9200.6-303, JULY 1992.

(4) USEPA IRIS, JANUARY 1993.

TABLE B.2

SITE HAZARD ANALYSIS
CEDARTOWN MUNICIPAL LANDFILL SITE
CEDARTOWN, GEORGIA

Site Activities	*Hazards*	*Prevention*
Site Reconnaissance Survey	Slip, trip, fall	Avoid steep slopes Proceed cautiously Wear treaded footwear
Drilling	Slip, trip, fall Entanglement Dust inhalation Chemical exposure Heat Stress	Good "housekeeping" procedures No loose clothing Available respirators PPE, APR Body Weight Monitoring
Groundwater Sampling	Chemical exposure	PPE, APR
Surface Water Sampling	Chemical Exposure	PPE, APR

APPENDIX C

DATA MANAGEMENT PLAN

TABLE OF CONTENTS

C.1.0 INTRODUCTION

The Data Management Plan (DMP) presented herein will identify procedures to be employed for managing all information, reports and correspondence (documents) associated with the Remedial Design/Remedial Action (RD/RA) to be conducted at the Cedartown Municipal Landfill Site (EML Site) in Cedartown, Georgia. These documents may be used as possible evidence in any court proceedings and as the basis upon which government officials will make decisions regarding the protection of human health and the environment. Therefore, these documents must be readily accessible and the integrity and accuracy of these documents must be maintained. This may be achieved by restricting access to the materials and implementing data management procedures.

The DMP is comprised of two separate tasks which are:

1) data management; and
2) document control.

The data management task consists of procedures used to handle and safeguard all data generated by field and laboratory programs. The task of document control involves implementing procedures to physically track all documents associated with the RD/RA. These two tasks will be expanded upon in the following sections.

C.2.0 DATA MANAGEMENT

Data generated from the field and analytical programs will form the basis upon which all decisions regarding remediation of the CML Site will be based. Appendix A - Sampling and Analysis Plan (SAP), consisting of both the Field Sampling and Analysis Plan (FSAP) and the Quality Assurance Project Plan, present procedures relating to the collection and analysis of samples. The data management task of the DMP presents procedures relating to recording and retrieval of all the field and laboratory data generated. For ease of discussion, the field and laboratory data can be categorized as follows:

1) field data;
2) laboratory analytical data; and
3) quality assurance/quality control data.

These three categories of data and security procedures will be discussed in the following sections.

C.2.1 MANAGEMENT OF FIELD DATA

Accurate and comprehensive recording of field operations will be achieved through the use of field logbooks, cameras, tape recording devices and computers.

C.2.1.1 Field Logbooks

The field logbook is the primary means of recording Site-related information. Generally, a bound document, the field logbook is used to record all pertinent site data such as the following:

1) general field observations;
2) field measurements and observations;
3) sample location and corresponding sample number;

4) relevant comments pertaining to the samples collected;
5) weather conditions;
6) a listing of all personnel involved in Site-related activities; and
7) an accurate log of all telephone conversations and Site meetings.

The field books generated will be numbered consecutively and maintained in a CRA file where they are not subject to potential damage or tampering.

C.2.1.2 Still Photographs and Video Film

Still photographs and video documentation provide a means of visually recording Site conditions and operations.

To ensure quick and accurate retrieval, all photographs and video films used during Site work will be properly documented, catalogued and stored. Documentation shall consist of the following:

1) identification of Site and project;
2) identification of the area and/or activity photographed;
3) date and time of photograph;
4) photographer's name;
5) weather conditions; and
6) project number.

Cataloging of photographs and video films will be done in a manner that ensures ease of accessibility. Storage of the photographs and video films will be in a location where they are not subject to damage or tampering.

C.2.1.3 Audio Cassette Recordings

On occasion, conditions may exist which will prevent the use of field logbooks. At such times only, an audio cassette tape recorder will

be used. Information recorded on the cassette will be transcribed into the field logbook within one week of making the recording. The recorded cassette then will be consecutively numbered, logged and stored. The tapes will be logged as to the date and purpose of the recording. Provisions will be made to store the tapes so that they are protected from magnetic fields, temperature extremes, reuse and tampering.

C.2.1.4 Computer Diskettes

At this time, it is envisaged that all analytical and field survey data will be compiled on 3 1/2-inch hard diskettes. In all cases where Site data are stored on diskettes, a backup copy of each computer diskette will be maintained. Each computer diskette will be consecutively numbered, identified as a primary or backup diskette, and identified as to the contents. The computer diskettes will be cataloged and stored as per the audio cassette tapes. Backup diskettes will be stored separately from primary diskettes.

C.2.2 MANAGEMENT OF LABORATORY ANALYTICAL DATA

Chain-of-custody protocols will be used to transport the samples to the contract laboratory and to track the samples during the analytical program, as discussed in Appendix A - SAP and Part B of Appendix B - QAPP. Copies of the generated chain-of-custody forms will be maintained by both the contract laboratory and CRA.

The contract laboratory will provide the data on a computer diskette in addition to the hard copy print. The computer diskette provided by the contract laboratory will be numbered, cataloged and stored as discussed in Section C.2.1.4.

The contract laboratory will maintain the integrity of their database through their own internal security procedures.

C.2.3 DATA VALIDATION

Validation of the data will be performed in accordance with the quality assurance/quality control (QA/QC) program as detailed in Part B of Appendix A - QAPP. Laboratory supervisory personnel and CRA's QA/QC officer will conduct the data validation.

The data will be manually screened as well to isolate any spurious data not detected by the QA/QC program.

C.2.4 DATA SECURITY

The integrity and confidentiality of the data generated during the RD/RA will be maintained by restricting access to the data. Only personnel actively involved in the project will be permitted access to the data. It will be the responsibility of these same personnel to ensure that the original documents are not mutilated or destroyed.

C.2.5 DATA BASE MANAGEMENT

All analytical data received from the contract laboratory, including QA/QC data, will be maintained on a computer database (DBase 3+). Access to the data base is restricted only to authorized personnel. The database is periodically backed up on magnetic tape. All back-up tape and stored.

C.3.0 DOCUMENT CONTROL

Documents used for and generated during the RD/RA will be stored and maintained in a unique CRA project file. These documents will be maintained and stored for a minimum of ten years after USEPA certification of completion on all requirements under the Unilateral Administrative Order (UAO) USEPA Docket No. 91-31-6. Access to the documents will be restricted to personnel actively engaged in the project and procedures will be implemented to track the documents.

All project documents will be accessible to the USEPA and its authorized representatives or copied on request, consistent with Section XX and XXI of the UAO.

The documents to be covered by the document control procedures can be categorized as follows:

1) background information files;
2) primary data documents; and
3) project documents generated during the course of the project.

These three categories will be further discussed in the following sections.

C.3.1 BACKGROUND INFORMATION FILES

The background information for the RD/RA consists of the following:

1) field notes from previous Site sampling programs;
2) hazard ranking system (HRS) package;
3) background information files from the Cedartown Municipal Landfill Site Group (Group);
4) background information collected by CRA (RI and FS reports); and
5) miscellaneous correspondence.

These documents will be included in the document control system.

C.3.2 PRIMARY DATA DOCUMENTS

Primary data documents for the RD/RA may consist of the following:

1) field logbooks;
2) analytical reports;
3) chain-of-custody forms;
4) regulatory agency correspondence;
5) Group correspondence;
6) personnel medical records;
7) logs of meetings and telephone conversations;
8) quality assurance/quality control data;
9) inventory of samples collected;
10) Site plans and data diskettes; and
11) survey notes.

These documents will be included in the document control system.

C.3.3 PROJECT DOCUMENTS

Project documents include the monthly reports annual reports and all reports generated during the RD/RA and submitted to USEPA. These documents will be included in the document control system.